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UNIFORM PROVISIONS CONCERNING THE APPROVAL OF PROTECTIVE HELMETS AND OF THEIR VISORS FOR DRIVERS AND PASSENGERS OF MOTOR CYCLES AND MOPEDS

UNITED NATIONS

Regulation No. 22

UNIFORM PROVISIONS CONCERNING THE APPROVAL OF PROTECTIVE HELMETS AND OF THEIR VISORS FOR DRIVERS AND PASSENGERS OF MOTOR CYCLES AND MOPEDS

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Regulation No. 22

UNIFORM PROVISIONS CONCERNING THE APPROVAL OF PROTECTIVE HELMETS AND OF THEIR VISORS FOR DRIVERS AND PASSENGERS OF MOTOR CYCLES AND MOPEDS

1. SCOPE

This Regulation applies to protective helmets for drivers and passengers of mopeds and of motor cycles with or without side-car 1/ and to the visors fitted to such helmets or intended to be added to them.

2. DEFINITIONS 2/

For the purposes of this Regulation,

2.1. "protective helmet" means a helmet primarily intended to protect the wearer's head against impact. Some helmets may provide additional protection;

2.2. "shell" means the hard part of the protective helmet, which gives it its general shape;

2.3. "protective padding" means a material used to absorb impact energy;

2.4. "comfort padding" means a material provided for the wearer's comfort;

2.5. "retention system" means the complete assembly by means of which the helmet is maintained in position on the head, including any devices for adjustment of the system or to enhance the wearer's comfort;

2.5.1. "chin-strap" means a part of the retention system consisting of a strap that passes under the wearer's jaws to keep the helmet in position;

2.5.2. "chin-cup" means an accessory of the chin-strap that fits round the point of the wearer's chin;

2.6. "peak" means an extension of the shell above the eyes;

1/ Protective helmets for wear in competitions may have to comply with stricter provisions.

2/ See also the diagram in annex 3.

2.7. "lower face cover" means a detachable or integral part of the helmet covering the lower part of the face;

2.8. "visor" means a transparent protective screen extending over the eyes and covering part of the face;

2.9. "goggles" mean transparent protectors that enclose the eyes;

2.10. "basic plane of the human head" means a plane at the level of the opening of the external auditory meatus (external ear opening) and the lower edge of the orbits (lower edge of the eye sockets);

2.11. "basic plane of the headform" means a plane which corresponds to the basic plane of the human head;

2.12. "reference plane" means a construction plane parallel to the basic plane of the headform at a distance from it which is a function of the size of the headform;

2.13. "protective helmet type" means a category of protective helmets which do not differ in such essential respects as:

2.13.1. the trade name or mark, or

2.13.2. the materials or dimensions of the shell, of the retention system or of the protective padding. However, a protective helmet type may include a range of helmet sizes, provided that the thickness of the protective padding in each size in the range is at least equal to that in the protective helmet which when subjected to the tests satisfied the requirements of this Regulation;

2.14. "visor type" means a category of visors which do not differ substantially in such essential characteristics as:

2.14.1. the trade name or mark, or

2.14.2. the materials, dimensions, manufacturing processes (such as extrusion of moulding), colour, surface treatment, system of attachment to the helmet;

2.15. "approval test" means a test to determine the extent to which a protective helmet type and/or a visor type submitted for approval is capable of satisfying the requirements;

2.16. "production quality test" means a test to determine whether the manufacturer is able to produce helmets and/or visors in conforming with the helmets and/or visors submitted for type approval;

2.17. "a routine testing" means the testing of a number of helmets and/or visors selected from a single batch to verify the extent to which they satisfy the requirements.

3. APPLICATION FOR APPROVAL

3.1. Application for approval of a protective helmet type

3.1.1. The application for approval of a protective helmet type, without or with one or more visor types, shall be submitted by the helmet manufacturer or by the holder of the manufacturer's name or trade mark or by his duly accredited representative, and for each type the application shall be accompanied by the following:

3.1.1.1. Drawings in triplicate to a scale of 1:1, in sufficient detail to permit identification of the helmet type, including the methods of assembly. The drawings shall show the position intended for the approval mark as set out in paragraph 5.1.4.1.,

3.1.1.2. A brief technical specification stating the materials used,

3.1.1.3. If the helmet is fitted with one or more visors:

3.1.1.3.1. Drawings in triplicate to a scale of 1:1, in sufficient detail to permit identification of the visor type and of the means of attachment to the helmet. The drawings shall show the position intended for the approval mark as set out in paragraph 5.1.4.1.,

3.1.1.3.2. A technical description of the visor stating the materials used, the manufacturing processes and, where appropriate, the surface treatment,

3.1.1.4. Ten helmets, with or without visors, taken from a reserve of not less than 20 specimens of various sizes, at least 9 of which shall be subjected to tests and 1 retained by the technical service responsible for conducting the approval test,

3.1.1.5. For each visor type, if any, 7 visors taken from a sample of not less than 14 specimens. Six visors shall be subjected to the tests and the seventh shall be retained by the technical service responsible for conducting the approval test.

3.2. Application for approval of a visor type

3.2.1. The application for approval of a visor type shall be submitted by the visor manufacturer or by the holder of the manufacturer's name or trade mark or by his duly accredited representative, and for each type the application shall be accompanied by:

3.2.1.1. Drawings in triplicate to a scale of 1:1, in sufficient detail to permit identification of the visor type and of its means of attachment to the helmet. The drawings shall show the position intended for the approval mark as set out in paragraph 5.2.4.1.,

3.2.1.2. A technical description stating materials used, the manufacturing processes and, where appropriate, the surface treatment,

3.2.1.3. List of approved helmet types to which the visor may be fitted,

3.2.1.4. Seven visors taken from a sample of not less than 14 specimens and 1 helmet to which the visors are intended to be fitted. Six visors shall be subjected to the tests and the seventh shall be retained by the technical service responsible for conducting the approval test.

3.3. The competent authority shall verify the existence of satisfactory arrangements for ensuring effective control of the conformity of production before type approval is granted.

4. MARKINGS

4.1. The protective helmets submitted for approval in conformity with paragraph 3.1. above shall bear:

4.1.1. On the helmet, the applicant's trade name or mark and an indication of the size,

4.1.2. On the visor, if any, the applicant's trade name or mark.

4.2. The visors submitted for approval in conformity with paragraph 3.2. above shall bear the applicant's trade name or mark.

4.3. The marking shall not be placed within the main visibility area.

4.4. The marking shall be clearly legible and indelible.

5. APPROVAL

5.1. Approval of a protective helmet type, without or with one or more visor types.

5.1.1. If the protective helmets and the visors, if any, submitted in pursuance of paragraph 3.1.1.4. above meet the requirements of this Regulation, approval shall be granted.

5.1.2. An approval number shall be assigned to each type approved. Its first two digits (at present 03) shall indicate the series of amendments incorporating the most recent major technical amendments made to the Regulation at the time of issue of the approval. The same Contracting Party shall not assign the same number to another helmet type covered by this Regulation.

5.1.3. Notice of approval or of extension or refusal or withdrawal of approval or production definitely discontinued of a protective helmet type, without or with one or more visor types pursuant to this Regulation shall be communicated to the Parties to the 1958 Agreement applying this Regulation, by means of a form conforming to the model in annex 1 A to this Regulation.

5.1.4. In addition to the marks described in paragraph 4.1.1. above, the following particulars shall be indicated on every protective helmet conforming to a type approved under this Regulation by means of the labels referred to in paragraph 5.1.7. below:

5.1.4.1. An international approval mark consisting of:

5.1.4.1.1. A circle surrounding the letter "E" followed by the distinguishing number of the country which has granted approval, 3/

3/ One for Germany, 2 for France, 3 for Italy, 4 for the Netherlands, 5 for Sweden, 6 for Belgium, 7 for Hungary, 8 for the Czech and Slovak Federal Republic, 9 for Spain, 10 for Yugoslavia, 11 for the United Kingdom, 12 for Austria, 13 for Luxembourg, 14 for Switzerland, 15 - (vacant), 16 for Norway, 17 for Finland, 18 for Denmark, 19 for Romania, 20 for Poland, 21 for Portugal and 22 for the Russian Federation. Subsequent numbers shall be assigned to other countries in the chronological order in which they ratify the Agreement concerning the Adoption of Uniform Conditions of Approval and Reciprocal Recognition of Approval for Motor Vehicle Equipment and Parts, or in which they accede to that Agreement, and the numbers thus assigned shall be communicated by the Secretary-General of the United Nations to the Contracting Parties to the Agreement.

5.1.4.1.2. The approval number and,

5.1.4.1.3. After the approval number, a dash followed by a production serial number. The production serial numbers shall be continuous for all protective helmets of the types approved in the same country, and each authority shall keep a register from which it can check that the type and production serial numbers correspond.

5.1.5. In addition to the marks described in paragraph 4.1.2. above, the following particulars shall be affixed visibly and in a readily accessible place to every visor, if any, conforming to a type approved with a helmet under this Regulation:

5.1.5.1. An international approval mark consisting of:

5.1.5.1.1. A circle surrounding the letter "E" followed by the distinguishing number of the country which has granted approval, 3/

5.1.5.1.2. A reference alphanumerical number.

5.1.6. Annex 2 A to this Regulation gives examples of the arrangements of the approval marks of a protective helmet.

5.1.7. In order to be considered as approved under this Regulation, subject to the provisions of paragraph 9 below, every protective helmet shall bear, sewn to its retention system, one of the labels referred to in paragraph 5.1.4. above. A different method of securing the label is authorized if it complies with the above provisions.

5.1.8. The labels referred to in paragraph 5.1.7. above may be issued either by the authority which has granted the approval or, subject to that authority's authorization, by the manufacturer.

5.1.9. The label referred to in paragraph 5.1.7. above shall be clearly legible and resistant to wear.

5.1.10. Approval of helmets of size 48/49 shall be granted without additional tests if such helmets belong to a type already approved which comprises size 50 in its range of sizes.

5.1.11. Approval of helmets larger than size 62 shall be granted without additional tests if such helmets belong to a type already approved which comprises size 62 in its range of sizes.

5.2. Approval of a visor type

5.2.1. Where the visors submitted in accordance with paragraph 3.2.1.4. above meet the requirements of paragraphs 6.15. and 7.8. of this Regulation, approval shall be granted.

5.2.2. An approval number shall be assigned to each type approved. Its first two digits (at present 03) shall indicate the series of amendments incorporating the most recent major technical amendments made to the Regulation at the time of issue of the approval. The same Contracting Party shall not assign the same number to another visor type covered by this Regulation.

5.2.3. Notice of approval or of extension or refusal or withdrawal of approval or production definitely discontinued of a visor type pursuant to this Regulation shall be communicated to the Parties to the 1958 Agreement applying this Regulation, by means of a form conforming to the model in annex 1 B to this Regulation.

5.2.4. In addition to the marks prescribed in paragraph 4.2. above, the following particulars shall be affixed visibly and in a readily accessible place to every visor conforming to a type approved under this Regulation:

5.2.4.1. An international approval mark consisting of:

5.2.4.1.1. The approval symbol described in paragraph 5.1.4.1., and

5.2.4.1.2. The approval number.

5.2.5. The approval mark shall be clearly legible and resistant to wear.

5.2.6. The marking shall not be placed within the main visibility area.

5.2.7. Annex 2 B to this Regulation gives an example of the arrangement of approval mark for a visor.

6. GENERAL SPECIFICATIONS

6.1. The basic construction of the helmet shall be in the form of a hard outer shell, containing additional means of absorbing impact energy, and a retention system.

6.2. The protective helmet may be fitted with ear flaps and a neck curtain. It may also have a detachable peak, a visor and a lower face cover.

6.3. No component or device may be fitted to or incorporated in the protective helmet unless it is designed in such a way that it will not cause injury and that, when it is fitted to or incorporated in the protective helmet the helmet still complies with the requirements of this Regulation.

6.4. The extent of the protection provided shall be as follows:

6.4.1. The shell shall cover all areas above plane AA' and shall extend downwards at least as far as the lines CDEF on both sides of the headform (see annex 4, fig. 1 A).

6.4.2. At the rear, the rigid parts and, in particular, the shell shall not be within a cylinder defined as follows (see annex 4, fig. 1 B):

Diameter 100 mm;

Axis, situated at the intersection of the medium plane of symmetry of the headform and of a plane parallel to and 110 mm below the reference plane.

6.4.3. The protective padding shall cover all the areas defined in paragraph 6.4.1., account being taken of the requirements of paragraph 6.5.

6.5. The helmet shall not dangerously affect the wearer's ability to hear. The temperature in the space between the head and the shell shall not rise inordinately; to prevent this, ventilation holes may be provided in the shell. The outer surface shall be perfectly smooth. Above the reference plane, the shape shall be in the form of a continuous, convex curve, except where shaping is provided for functional purposes. Below the reference plane, irregularities in the curve shall be smoothly faired. The shell shall not incorporate an integral peak, but may incorporate an integral lower face cover.

Where means for attaching a visor are not provided, the profile at the front edge shall not prevent the wearing of goggles.

6.6. There shall be no external projections greater than 5 mm above the outer surface of the shell. Where a goggle fitting is provided at the rear of the helmet and is designed to be detachable, this requirement shall not apply to such a fitting.

6.7. Any external projections other than press-fasteners shall be smooth and adequately faired. Rivet heads shall be radiused and shall not project more than 2 mm above the outer surface of the shell.

6.8. There shall be no inward-facing sharp edges on the inside of the helmet; rigid, projecting internal parts shall be covered with padding so that any stresses transmitted to the head are not highly concentrated.

6.9. The various components of the protective helmet shall be so assembled that they are not liable to become easily detached as a result of an impact.

6.10. Retention systems shall be protected from abrasion.

6.11. The helmet shall be held in place on the wearer's head by means of a retention system which is secured under the lower jaw and is firmly attached to the shell.

6.11.1. If the retention system includes a chin-strap, the strap shall be not less than 20 mm wide under a load of 150 N $\pm$ 5 N applied under the conditions prescribed in paragraph 7.6.2.

6.11.2. The chin-strap shall not include a chin-cut.

6.11.3. The device to open the retention system shall not be capable of opening other than as a result of a deliberate act. In the case of a press-fastener opening device, the press-fastener shall be recessed, i.e. the surface to which the pressure is applied shall be fitted with a fairing about its whole periphery so that opening does not occur when the surface is pressed with a sphere of 100 mm diameter.

6.11.4. The retention of the helmet on the head by the retention system shall be verified when the test described in paragraph 7.7 is carried out. When a helmet type includes a range of sizes, the helmet subjected to the test shall be that presenting the least favourable conditions (such as the thickest padding, etc.).

6.12. The characteristics of the materials used in the manufacture of helmets shall be known not to undergo appreciable alteration under the influence of ageing, or of the circumstances of use to which the helmet is normally subjected, such as exposure to sun, extremes of temperature and rain. For those parts of the helmet coming into contact with the skin, the materials used shall be known not to undergo appreciable alteration through the effect of perspiration or of toilet preparations. The manufacturer shall not use materials known to cause skin troubles. The suitability of a proposed new material shall be established by the manufacturer.

6.13. After the performance of one of the prescribed tests, the protective helmet shall not exhibit any breakage or deformation dangerous to the wearer.

6.14. Peripheral vision

6.14.1. To carry out the test, the technical service shall select from among the existing sizes of a helmet type the size it considers likely to yield the least favourable result;

6.14.2. The helmet shall be placed on the headform corresponding to its size by the procedure set out in annex 5 to this Regulation;

6.14.3. In the above conditions there shall be no occultation in the field of vision bounded by: (see annex 4, figs. 2A, 2B and 2C)

6.14.3.1. horizontally: two segments of dihedral angles symmetrical in relation to the median longitudinal vertical plane of the headform and situated between the reference and the basic planes.

Each of these dihedral angles is defined by the median longitudinal vertical plane of the headform and the vertical plane forming an angle of not less than 105° with the median longitudinal vertical plane and whose edge is the straight line LK;

6.14.3.2. upwards: a dihedral angle defined by the reference plane of the headform and a plane forming an angle of not less than 7° with the reference plane and whose edge is the straight line L_1 L_2, the points L_1 and L_2 representing the eyes;

6.14.3.3. downwards: a dihedral angle defined by the basic plane of the headform and a plane forming an angle of not less than 45° with the basic plane and whose edge is the straight line K_1 K_2.

6.15. Visors

6.15.1. The systems of attachment of a visor to a helmet shall be such that the visor is removable. It must be possible to manoeuvre the visor out of the field of vision with a simple movement of one hand. However, the latter prescription may not be required for helmets which do not provide chin protection provided that a label is attached to the helmet to the effect of warning the purchaser that the visor cannot be manoeuvred.

6.15.2. Angle opening (see annex 9)

6.15.3. Field of vision

6.15.3.1. The visor shall not comprise any part liable to impair the user's peripheral vision as defined in paragraph 6.14. whatever the position of the visor is. Furthermore, the lower edge of the visor shall not be situated in the downward field of vision of the user as defined in paragraph 6.14. when the visor is in closed position. The surface of the visor in the peripheral field of vision of the helmet may however include:

The lower edge of the visor, provided that it is made of a material with at least the same transmittance as the rest of the visor,

A device to allow the visor to be manoeuvred. However, if this device is situated within the field of vision of the visor defined in paragraph 6.15.3.2. below it shall be at the lower edge and present a maximum height (h) of 10 mm and its width (l) shall be such that the product (h x l) at the most is equal to 1.5 cm^2. Moreover, it must be made of a material with at least the same transmittance as the visor and it must be free of any engraving, paint or other covering feature,

Fixings and devices to allow the visor to be manoeuvred if they are situated outside of the field of vision of the visor and if the total surface of these parts, including devices, if any, to allow the visor to be manoeuvred does not exceed 2 cm^2, possibly distributed on each side of the field of vision.

6.15.3.2. The field of vision of the visor is defined by:

A dihedron defined by the reference plane of the headform and a plane forming an angle of at least 7° upwards, its edge being the straight line L_1L_2, with points L_1 and L_2 representing the eyes,

Two segments of dihedral angles symmetrical to the median vertical longitudinal plane of the headform. Each of these dihedral angles is defined by the median vertical longitudinal plane of the headform and the vertical plane forming with this plane an angle of 90°, its edge being the straight line LK, and the lower edge of the visor.

6.15.3.3. To determine the field of vision as defined in paragraph 6.15.3.2. above, the helmet fitted with the visor being tested shall be placed on a test headform of suitable size in accordance with the provisions of paragraph 7.3.1.3.1., the visor then being placed in a closed position.

6.15.3.4. Visors shall be free from any significant defects likely to impair the vision, such as bubbles, scratches, inclusions, dull spots, holes, mould marks, scratches or other defects originating from the manufacturing process in the field of vision."

6.15.4. Visors shall in addition be sufficiently transparent, shall not cause any noticeable distortion of object as seen through the visor, and shall not give rise to any confusion between the colours used in road traffic signs and signals.

7. TESTS

7.1 Sampling and use of samples

Test	Number of helmets to be conditioned:				Total
	ambient-temperature and hygrometry conditioning	heat conditioning	low-temperature conditioning	ultraviolet-radiation conditioning and moisture conditioning	
Impact absorption	1	1	1	1	4 + 1*
Resistance to penetration					1*
Rigidity	2				2
Retention system	1				1
					9

* One helmet to be conditioned at the choice of laboratory.

For each headform size, one heat-conditioned and one low temperature-conditioned impact absorption test shall be performed.

7.2. Types of conditioning

7.2.1. Ambient-temperature and hygrometry conditioning

The helmet shall be exposed to a temperature of 25° C ± 5° C and a relative humidity of 65% ± 5% for at least 4 hours.

7.2.2. Heat conditioning

The helmet shall be exposed to a temperature of 50° C ± 2° C for not less than 4 hours and not more than 6 hours.

7.2.3. Low-temperature conditioning

The helmet shall be exposed to a temperature of -20° C ± 2° C for not less than 4 hours and not more than 6 hours.

7.2.4. Ultraviolet-radiation conditioning and moisture conditioning

The outer surface of the protective helmet shall be exposed successively to:

7.2.4.1. ultraviolet irradiation by a 125-watt zenon-filled quartz lamp for 48 hours at a range of 25 cm;

7.2.4.2. spraying for 4 to 6 hours with water at ambient temperature at the rate of 1 litre per minute.

7.3. Impact-absorption tests

7.3.1. Description of test

7.3.1.1. Principle

Impact absorption capacity is determined by recording against time the acceleration imparted to a headform fitted with the helmet, when dropped in guided free fall at a specific impact velocity upon a fixed steel anvil.

7.3.1.2. Marking of points of impact

Before conditioning, the points of impact are marked as indicated in annex 4 (fig. 3).

7.3.1.3. Positioning of the helmet

After conditioning:

7.3.1.3.1. The helmet shall be positioned in accordance with the requirements of annex 5 on a headform of appropriate size selected from among those listed in paragraph 7.3.3.2. 4/ The helmet is then tipped towards the rear so that the front edge of the helmet in the median plane is displaced by 25 mm; the retention system is then adjusted under the chin of the headform; if the system includes an adjustable chin strap, the strap is tightened as much as possible;

7.3.1.3.2. The test headform shall be so positioned that the designated point on the helmet is vertically above the centre of the anvil. The plane tangential to the point of impact shall be horizontal.

4/ Helmets of sizes not listed in paragraph 7.3.3.2. shall be tested with the next smaller headform listed. Helmets of size 60 or greater shall be tested with the headform "M". However, at the request of the manufacturer and by agreement with the technical service responsible for conducting the tests, helmets of size 62 or larger may be tested with the headform "O".

7.3.1.4. Test

The test shall be performed not more than two minutes after the helmet is taken from the conditioning chamber. The drop height shall be such that the unit constituted by the headform and helmet falls on the test anvil at a velocity which, immediately before impact, is equal to:

7 m/s (+ 0. - 0.15) for the anvil specified in paragraph 7.3.2.3.1

6 m/s (+ 0. - 0.15) for the anvil specified in paragraph 7.3.2.3.2.

7.3.1.5. Measurements

The velocity of the moving mass is measured between 1 cm and 6 cm before impact, to an accuracy of 1%. The acceleration against time at the centre of gravity of the headform is measured and recorded as prescribed in paragraph 7.3.2.5.

7.3.2. Apparatus (see annex 8, fig. 1)

7.3.2.1. Description

The test apparatus shall comprise:

An anvil rigidly fixed to a base

A free fall guidance system

A mobile system supporting the helmeted headform

A metal headform fitted with a tridirectional accelerometer and a measuring assembly

A system by which the point of impact can be brought into correspondence with the centre of the anvil.

7.3.2.2. Base

The base shall be made of steel or concrete or a combination of these materials and have a mass of at least 500 kg.

It shall be so constructed that there is no significant deformation of the surface under the test load.

No part of the base or anvil shall have a resonance frequency liable to affect the measurements.

7.3.2.3. Anvils

7.3.2.3.1. The flat steel anvil shall have a circular impact face of 130 mm diameter ± 3 mm.

7.3.2.3.2. The hemispherical steel anvil shall have an impact face of 50 mm radius ± 2 mm.

7.3.2.4. Mobile system and guides

The mobile system supporting the headform shall be such that its characteristics do not affect the measurement of acceleration at the centre of gravity of the headform. It shall also be such that any point in the area ACDEF can be positioned vertically above the centre of the anvil.

The guides shall be such that the impact velocity is not less than 95% of the theoretical velocity.

7.3.2.5. Accelerometer and measuring assembly

The accelerometer shall be capable of withstanding a maximum acceleration of 2,000 g without damage. Its maximum mass shall be 50 grammes. The measuring system, including the drop assembly, shall have a frequency response in accordance with channel frequency class (CFC) 1000 of the International Standard ISO "Road vehicles - Techniques of measurement in impact tests - Instrumentation" (Ref. No. ISO 6487-1980).

7.3.3. Headforms

7.3.3.1. The headforms used for the impact-absorption tests shall be made of a metal of characteristics such that the headforms present no resonance frequency below 3,000 Hz.

7.3.3.2. The general characteristics of the test headforms to be used shall be as follows:

Symbols	Size (in cm)	Mass (in kg)
A	50	3.1 ± 0.10
E	54	4.1 ± 0.12
J	57	4.7 ± 0.14
M	60	5.6 ± 0.16
O	62	6.1 ± 0.18

7.3.3.3. The shape of the test headforms shall be:

Above the reference plane, in conformity with the detailed dimensions of the reference headforms shown in annex 6;

Below the reference plane, in conformity with the detailed dimensions of the test headforms shown in annex 7.

7.3.3.4. The centre of gravity of the headform shall be near the point G on the central vertical axis at "1" mm below the reference plane, as defined in annex 7. The headform shall contain, near its centre of gravity, a housing for a tridirectional accelerometer.

7.3.3.5. For tests other than those of impact-absorption, headforms complying only with the geometrical provisions of paragraph 7.3.3.3. above, may be used.

7.3.4. Selection of points of impact

7.3.4.1. Each test shall be carried out first with the flat anvil and then with the hemispherical anvil on the same helmet at two neighbouring but separate points. The distance between the two points shall be 15 mm ± 5 mm except for the two points X and X 1, for which the distance shall be 60 mm ± 5 mm.

7.3.4.2. Six points of impact are defined for each type of helmet:

In the frontal area, B and B 1 situated in the vertical longitudinal plane of symmetry of the helmet and above point B.

In the lateral area, X and X 1, 60 mm apart, at an angle of 45° rearwards and upwards;

P and P 1, above the plane parallel to the base plane passing through point A.

7.3.4.3. The test sequence shall conform to the table below:

Conditioning	Anvils	Points of impact
Atmosphere "	Flat then hemispherical " " "	B and B 1 X and X 1
To be selected by the laboratory	Flat then hemispherical	P and P 1
High temperature " "	Flat then hemispherical " " "	B and B 1 X and X 1
Low temperature " "	Flat then hemispherical " " "	B and B 1 X and X 1
Radiation and rain " " "	Flat then hemispherical " " "	B and B 1 X and X 1

7.3.5. Requirements

The absorption efficiency shall be considered sufficient where the resultant acceleration measured at the centre of gravity of the headform is < 150 g. 5/ For any 5 ms continuously and at no time exceeds 300 g. 5/

7.4. Resistance-to-penetration test

7.4.1. The protective helmet shall be subjected to the penetration test at two points within the area of protection at least 75 mm distant from each other and from any earlier point of impact. The helmet shall first undergo the process of conditioning which, in the opinion of the test laboratory, gave the least satisfactory results in the impact-absorption test.

7.4.2. The protective helmet shall be placed, with an initial load of 10 N, on a headform oriented in such a way that the plane tangential to the shell at the point selected for the test is substantially horizontal. A metal punch with a conical head rounded at the top shall be placed vertically to touch the shell at the point selected and held in position by a ring. A metal drop hammer shall fall on the top of the punch, and the depth to which the point penetrates into the shell shall be measured by means of an inertia-free device, such as a photoelectric device, indicating the minimum vertical distance reached, in this test between the head of the punch and the headform.

5/ $g = 9.81\ m/sec^2$

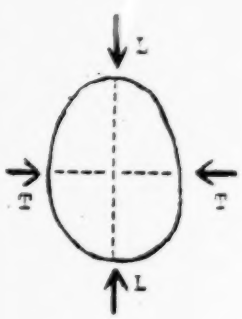
7.4.3. The testing device mentioned in paragraph 7.4.2. above shall have the following characteristics:

Mass of punch	0.3 kg ± 10 g
Angle of cone forming punch head	60° ± 1°
Radius of rounded top of punch head	0.5 mm
Mass of drop hammer	3 kg ± 25 g
Height of fall measured between top face of punch and lower face of drop hammer	1 m ± 0.005 m

7.4.4. During the test, the head of the punch shall not come closer than 5 mm, measured vertically, to the headform.

7.5. Rigidity tests

7.5.1. The helmet, after undergoing ambient-temperature and hygrometry conditioning, shall be placed between two parallel plates by means of which a known load can be applied along the longitudinal axis (line LL in the figure opposite) or the transverse axis (line TT in the figure). An initial load of 30 N shall be applied, and after two minutes the distance between the plates shall be measured. The load shall then be increased by 100 N every two minutes to a maximum of 630 N. After two minutes of application of the 630 N load, the distance between the plates shall be measured.



7.5.2. The load applied to the plates shall then be reduced to 30 N again and kept at that value for five minutes; the distance between the plates shall then be measured.

7.5.3. The helmet used for the test along the longitudinal axis shall be a new helmet, and another new helmet shall be used for the test along the transverse axis.

7.5.4. In the test along each axis, the deformation measured under the 630 N load shall not exceed that measured under the initial 30 N load by more than 40 mm.

7.5.5. After restoration of the 30 N load, the deformation measured shall not exceed that measured under the initial 30 N load by more than 15 mm.

7.6. Dynamic test of the retention system (see annex 8, figure 2)

7.6.1. The helmet shall be positioned as prescribed in paragraph 7.3.1.3.1. above.

7.6.2. In this position the helmet is held by the shell at a point traversed by the vertical axis passing through the centre of gravity of the headform. The headform is equipped with a load-bearing device aligned with the vertical axis passing through the centre of gravity of the headform and with a device to measure the vertical displacement of the point of application of the force. A guide and arrest device for a falling mass shall then be attached below the headform. The mass of the headform so equipped shall be 15 kg ± 0.5 kg, which shall be the pre-loading on the retention system for determining the position from which the vertical displacement of the point of application of the force shall be measured.

7.6.3. The falling mass of 10 kg ± 0.1 kg shall then be released and shall drop in a guided free fall from a height of 750 ± 5 mm.

7.6.4. During the test, the dynamic displacement of the point of application of the force shall not exceed 35 mm.

7.6.5. After two minutes, the residual displacement of the point of application of the force, as measured under a mass of 15 kg + 0.5 kg, shall not exceed 25 mm.

7.6.6. Damage to the retention system shall be accepted provided that it is still possible to take the helmet easily off the headform and that the specifications set out in paragraphs 7.6.4. and 7.6.5. are met.

7.7. Retention (detaching) test

7.7.1. The helmet, previously conditioned at ambient temperature and hygrometry, is attached to the appropriate headform, selected from those listed in annex 4, in accordance with the requirements of paragraph 7.3.1.3.1. of this Regulation.

7.7.2. A device to guide and release a falling mass (the total mass being 3 kg ± 0.1 kg) is hooked on to the rear part of the shell in the median vertical plane of the helmet, as shown in annex 8, figure 3.

7.7.3. The falling mass of 10 kg ± 0.01 kg is then released and drops in a guided free fall from a height of 0.50 m ± 0.01 m. The guiding devices shall be such as to ensure that the impact speed is not less than 95% of the theoretical speed.

7.7.4. After the test the angle between the reference line situated on the shell of the helmet and the reference plane of the headform shall not exceed 30°.

7.8. Visor tests

7.8.1. Sampling and use of samples

The six visors are used as follows:

Paragraph	Test	1	2	3	4	5	6	7	T
6.15.3	Field of vision of the visor	X						RETAINED	1
6.15.3.4. 6.15.4	Quality of material and surface	X	X	X					3
7.8.2.	Mechanical characteristics				X	X	X		3
7.8.3.	Optical qualities and scratch resistance	X	X	X					3

7.8.2. Mechanical characteristics

7.8.2.1. The helmet, fitted with its visor and previously conditioned in accordance with the provisions of paragraph 7.2.3., shall be placed in accordance with the provisions of paragraph 7.3.1.3.1. on a test headform of suitable size. The test headform selected from among those shown in annex 4 shall be so placed that the basic plane is vertical.

7.8.2.2. The test apparatus used shall be as described in paragraph 7.4.3., the metal punch being placed in contact with the visor in the vertical symmetrical plane of the headform to the right of point K. The apparatus shall be designed in such a way that the punch is stopped not less than 5 mm above the headform.

7.8.2.3. When the drop-hammer falls from a height of 1 + 0.005 m, measured between the top face of the punch and the lower face of the hammer, it shall be ascertained that:

7.8.2.3.1. no sharp splinters are produced if the visor is shattered. Any segment having an angle less than 60° shall be considered as a sharp splinter.

7.8.3. Optical qualities and scratch resistance

7.8.3.1. Test procedure

7.8.3.1.1. The test piece shall be taken from the flattest part of the visor in the area specified in paragraph 6.15.3.2. and its minimum dimensions shall be 50 mm x 50 mm. The test shall be carried out on the face corresponding to the outside of the visor.

7.8.3.1.2. The test piece shall undergo ambient-temperature and hygrometry conditioning in accordance with paragraph 7.2.1.

7.8.3.1.3. The test shall comprise the following sequence of operations:

7.8.3.1.3.1. The surface of the test piece shall be washed in water containing 1% detergent and rinsed with distilled or demineralized water, then carefully dried with a grease-free and dust-free linen cloth.

7.8.3.1.3.2. Immediately after drying, the luminous transmittance and the light diffusion before abrasion are measured according to one of the methods specified in annex 11.

7.8.3.1.3.3. The test piece shall then be subjected to the abrasion test described in annex 10, during which 3 kg of abrasive material shall be projected at the sample.

7.8.3.1.3.4. Following the test, the test piece shall again be cleaned in accordance with paragraph 7.8.3.1.3.1.

7.8.3.1.3.5. Immediately after drying the light diffusion after abrasion shall be measured by using again the same method used in accordance with paragraph 7.8.3.1.3.2. above.

7.8.3.2. Requirements

7.8.3.2.1. Three similar test pieces taken from the area specified in paragraph 6.15.3.2. of the visor shall meet the requirements of paragraphs 7.8.3.2.1.1. and 7.8.3.2.1.2.

7.8.3.2.1.1. The luminous transmittance measured according to one of the two methods specified in annex 11 shall not be less than 75%.

7.8.3.2.1.2. The light diffusion shall not exceed the following values:

Before abrasion	After abrasion
0.65 $cd/m^2/1$ a/	5.0 $cd/m^2/1$ a/
2.5% b/	20% b/

a/ measured according to annex 11, Method (a);

b/ measured according to annex 11, Method (b).

8. TEST REPORTS

8.1. Each technical service shall prepare reports on the results of the approval tests and keep such reports for two years. In the case of impact-absorption and resistance-to-penetration tests, the report shall indicate, in addition to the results of the tests, the location on the helmet of the points of impact with the anvil or of the punch.

9. CONFORMITY OF PRODUCTION AND ROUTINE TESTS

9.1. Every helmet and visor bearing the particulars referred to in paragraph 5.1.4. above shall conform to the type approved.

9.2. The technical service responsible for conducting approval tests under this Regulation shall take the necessary steps to ensure that production conforms to the type approved. For this purpose the provisions of paragraphs 9.2.1, 9.2.2., 9.2.3, and 9.2.4. shall be applied.

9.2.1. To ensure that the manufacturer's production system is acceptable, the responsible service shall carry out tests of production quality in accordance with paragraph 9.3.

9.2.2. Subsequently, for the purpose of checking conformity with the type approved, it is sufficient that this service satisfies itself that the manufacturer complies with the quality control procedures prescribed in paragraph 9.4.

9.2.3. If, however, the controls are carried out directly by this service, the methods used shall be such that they present reliable results equivalent to those presented by the procedures prescribed in paragraph 9.2.2. above. In particular, the procedure prescribed in paragraph 9.5. constitutes an appropriate method.

9.2.4. Each technical service shall prepare reports on tests made to check conformity with the helmet or visor type approved and shall keep such reports.

9.3. Minimum requirements for production quality testing

9.3.1. The first month's production of each new approved helmet type shall be subjected to production quality tests.

For this purpose, 40 helmets shall be taken at random, 30 of them of average size and 10 of a size to be determined by the technical service. These helmets shall be subjected to tests selected by the technical service from among those described in paragraphs 6 anJ 7 of this Regulation, and in all cases to the tests prescribed in paragraphs 9.3.2. and 9.3.3. However, if the first month's production is likely to exceed 3,200 units, the sample shall be taken from the first 3,200 helmets produced. If production for the first month is less than 300 units, the sample shall be taken from the first 600 helmets produced, but in any event within the six months following commencement of manufacture.

9.3.1.1. Starting production each new visor type (incorporated in the helmet approval or approved as a single visor) shall be subjected to production quality tests. For this purpose a number of visors according to table 9.4.3. "testing-schedule for visors" shall be subjected to tests selected by the technical service from among those described in paragraphs 6 and 7 of this Regulation, and in all cases to the tests prescribed in paragraphs 7.8.2. and 7.8.3.

9.3.2. Retention system

9.3.2.1. Of the 40 helmets, at least 15 shall be subjected to the retention-system test described in paragraph 7.6.2.

9.3.3. Impact absorption

9.3.3.1. Of the 40 helmets, three batches each of not less than 10 helmets shall be taken.

9.3.3.2. All the helmets of one batch shall be subjected first to the same conditioning procedure, as selected by the technical service, and then to the impact-absorption test at the same group of points of impact selected from among those specified in paragraph 7.3.4.

9.3.3.3. Each batch shall be subjected to the impact-absorption test at a different group of points of impact after having been subjected to a different conditioning procedure.

9.3.4. The results of the tests described in paragraph 9.3.2. and 9.3.3. shall satisfy the following two conditions:

No value shall exceed 1.1 L;

$\bar{X}$ + 2.4 S shall not exceed L;

where:

L is the limiting value prescribed for each approval test;

$\bar{X}$ is the average of the values;

S is the standard deviation of the values.

The value 2.4 specified above is valid only for a series of tests covering at least 10 helmets tested under the same conditions.

9.3.5. Notwithstanding the requirements of this paragraph for types of helmet, approval for which has been granted only for sizes larger than size 62, the production quality tests for helmets defined in paragraph 9.3 shall not be required.

9.4 Minimum requirements for routine quality control by the manufacturer.

9.4.1. The holder of an approval granted pursuant to this Regulation shall be obliged to carry out continuous quality control on a statistical basis and by sampling, or to see that it is carried out, so as to guarantee uniformity of helmet and/or visor production and conformity to the provisions of this Regulation.

9.4.2. The manufacturer or his duly accredited representative shall be held responsible for:

The existence of quality control procedures;

The availability of equipment necessary for the verification of conformity;

Keeping records of test results, test reports and any documents attached;

The use of the test results to verify and ensure the uniformity of helmet and/or visor production, allowing for the variation admissible in industrial production.

9.4.3. The helmets and/or visors selected for verification of conformity shall be subjected to tests, which may be selected in agreement with the competent authorities, from among those described in paragraph 7.

The manufacturer or his duly accredited representative shall in particular be required to carry out the following tests, or to arrange for them to be carried out, at intervals proportional to the weekly production of helmets and/or visors of an approved type, as indicated below:

Testing schedule for helmets

Weekly production by enterprise	Impact-absorption test	Retention-system test
Up to 800 helmets	1% of production	0.5% of production
From 801 to 1 200 helmets	8 helmets	4 helmets
From 1 201 to 3 200 helmets	13 helmets	7 helmets
From 3 201 to 10 000 helmets	20 helmets	10 helmets
More than 10 000 helmets	32 helmets	16 helmets

Testing schedule for visors

Weekly production by enterprise	Tests required (specifications of paragraphs)	
	7.8.2. 7.8.3.	6.15.2. 6.15.3. 6.15.4.
Up to 800 visors	1% of production at least 2 visors	0.2% of production at least 1 visor
From 801 to 1 200 visors	8 visors	2 visors
From 1 201 to 3 200 visors	13 visors	3 visors
From 3 201 to 10 000 visors	20 visors	5 visors
More than 10 000 visors	32 visors	8 visors

The holder of the approval shall be required, whenever sampling has revealed a failure to conform to the test requirements for a particular type, to take all measures necessary to restore conformity of production in that respect.

9.4.4. The service which granted approval may at any time check the methods used to verify conformity; for this purpose, the representative of such service

9.4.4.1. Shall, at every inspection, require that the records of test results and production statistics should be made available to him;

9.4.4.2. May take a random selection of helmets, which shall be forwarded to the technical service which conducted the approval tests, the minimum number of helmets and/or visors thus selected to be determined by the manufacturer.

9.5. Minimum requirements for routine checks by Governments

9.5.1. The tests shall be carried out on helmets and/or visors offered or intended for sale.

9.5.2. If the requirements of the production quality test are satisfied, the manufacturer or his duly accredited representative shall divide the helmets and/or visors into batches as far as possible homogeneous with respect to the raw materials or intermediate products used for their production and the conditions of manufacture. A batch shall comprise not more than 3,200 units. It may comprise helmets and/or visors of different sizes or of different types, provided the sizes and/or types are accepted by the technical service responsible for conducting approval tests as equivalent for test purposes.

In such a case, the type or size of helmet and/or visor to be subjected to the tests shall be selected at the discretion of the competent authority.

9.5.3. A sample shall be taken from each batch in conformity with the requirements of paragraph 9.5.4. The samples thus taken shall be subjected to tests selected among those described in paragraphs 6 and 7 of this Regulation. Such tests shall include at least:

9.5.3.1. for helmets two impact-absorption tests in accordance with paragraph 7.3. and the retention-system test described in paragraph 7.6.,

9.5.3.2. for visors the tests in accordance with paragraphs 7.8.2. and 7.8.3.

9.5.4. To be accepted, a batch of helmets and/or visors shall satisfy the following conditions for each characteristic:

Batch size	Sample size	Combined total	Batch accepted if number of defective units is:	Batch rejected if number of defective units is:	Stringency of inspection
<N≤ 500	first: 4		0	2	
	second: 4	8	1	2	normal
500 <N≤ 3 200	first: 5		0	2	
	second: 5	10	1	2	
0 <N≤ 1 200	first: 8		0	2	
	second: 8	16	1	2	tightened
1 200 <N≤ 3 200	first: 13		0	3	
	second: 13	26	3	4	

This system of double sampling means that: for normal stringency, when no defective unit is found in the first sample, the batch is to be accepted without a second sample being tested.

If two defective units are found, the batch shall be rejected.

If one defective unit is found in the first sample, a second sample shall be taken and the combined total shall satisfy the condition in column 4 above.

9.5.5. If two out of five consecutive batches are rejected, the more stringent requirements shall be imposed in lieu of the normal conditions. Normal conditions shall reapply when five consecutive batches have been accepted.

9.5.6. If two consecutive batches subjected to the more stringent conditions are rejected, the provisions of section 11 shall be applicable.

10. MODIFICATION AND EXTENSION OF APPROVAL OF A HELMET OR A VISOR TYPE

10.1. Every modification of the helmet and/or the visor type shall be notified to the administrative department which approved the helmet and/or the visor type. The department may then either:

10.1.1. Consider that the modifications made are unlikely to have an appreciable adverse effect and that in any case the protective helmet and/or visor still complies with the requirements; or

10.1.2. Require a further test report from the technical service responsible for conducting the tests.

10.2. Confirmation or refusal of approval, specifying the alterations shall be communicated by the procedure specified in paragraphs 5.1.3. and 5.2.3. above to the Parties to the Agreement applying this Regulation.

10.3. The competent authority issuing the extension of approval shall assign a series number for such an extension and inform thereof the other Parties to the 1958 Agreement applying this Regulation by means of a communication form conforming to the model in annex 1A or annex 1B to this Regulation.

11. PENALTIES FOR NON-CONFORMITY OF PRODUCTION

11.1. The approval granted in respect of a helmet or a visor type pursuant to this Regulation may be withdrawn if the requirements set forth above are not met.

11.2. If a Contracting Party to the Agreement applying this Regulation withdraws an approval it has previously granted, it shall forthwith so notify the other Contracting Parties applying this Regulation, by means of a communication form conforming to the model in annex 1A or annex 1B to this Regulation.

12. PRODUCTION DEFINITELY DISCONTINUED

If the holder of the approval completely ceases to manufacture a helmet or a visor type approved in accordance with this Regulation, he shall so inform the authority which granted the approval. Upon receiving the relevant communication that authority shall inform thereof the other Parties to the 1958 Agreement applying this Regulation by means of a communication form conforming to the model in annex 1A or annex 1B to this Regulation.

13. INFORMATION FOR WEARERS

13.1. Every protective helmet offered for sale shall bear a clearly visible label with the following inscription in the national language, or in at least one of the national languages, of the country in which it is offered for sale:

"For adequate protection, this helmet must fit closely and be securely attached. Any helmet that has sustained a violent impact should be replaced".

13.2. Additionally where hydrocarbons, cleaning fluids, paints, transfers or other extraneous additions affect the shell material adversely a separate and specific warning shall be emphasized in the above-mentioned label and worded as follows:

"'Warning' - Do not apply paint, stickers, petrol or other solvents to this helmet".

13.3. Every protective helmet shall be clearly marked with its mass to the nearest 50 grammes and with its size.

13.4. Every protective helmet offered for sale shall bear a label showing the type or types of visor that have been approved at the manufacturer's request.

13.5. Every visor offered for sale shall bear a label showing the types of protective helmet for which it has been approved.

14. NAMES AND ADDRESSES OF TECHNICAL SERVICES RESPONSIBLE FOR CONDUCTING APPROVAL TESTS, AND OF ADMINISTRATIVE DEPARTMENTS

The Parties to the 1958 Agreement applying this Regulation shall communicate to the United Nations Secretariat the names and addresses of the technical services responsible for conducting approval tests and of the administrative departments which grant approval and to which forms certifying approval or extension or refusal or withdrawal of approval, or production definitely discontinued, issued in other countries, are to be sent.

Annex 1 A

COMMUNICATION
(Maximum format: A4 (210 x 297 mm))

issued by: Name of administration
.....
.....
.....

concerning: 2/ APPROVAL GRANTED
APPROVAL EXTENDED
APPROVAL REFUSED
APPROVAL WITHDRAWN
PRODUCTION DEFINITELY DISCONTINUED

of a type of protective helmet without/with 2/ one/more 2/ visor type(s)

pursuant to Regulation No. 22

Approval No. ..... Extension No. .....

1. Trade mark: .....
2. Type: .....
3. Sizes: .....
4. Manufacturer's name: .....
5. Address: .....
6. If applicable, name of manufacturer's representative: .....
7. Address: .....
8. Brief description of helmet: .....
9. Type of visor or visors: .....
10. Brief description of visor or visors: .....
11. Submitted for approval on: .....
12. Technical service responsible for conducting approval tests: .....
13. Date of report issued by that service: .....
14. Number of report issued by that service: .....
15. Comments: .....
16. Approval granted/extended/refused/withdrawn 2/ .....
17. Place: .....
18. Date: .....
19. Signature: .....
20. The following documents, bearing the approval number shown above, are available on request .....

1/ Distinguishing number of the country which has granted/extended/refused/withdrawn approval (see approval provisions in the Regulation).

2/ Strike out what does not apply.

Annex 1 B

COMMUNICATION
(Maximum format: A4 (210 x 297 mm))

issued by: Name of administration
.....
.....
.....

concerning: 2/ APPROVAL GRANTED
APPROVAL EXTENDED
APPROVAL REFUSED
APPROVAL WITHDRAWN
PRODUCTION DEFINITELY DISCONTINUED

of a type of helmet visor

pursuant to Regulation No. 22

Approval No. ..... Extension No. .....

---

1. Trade mark: .....
2. Type: .....
3. Manufacturer's name: .....
4. Address: .....
5. If applicable, name of manufacturer's representative: .....
6. Address: .....
7. Brief description of visor: .....
8. Types of helmet to which the visor may be fitted: .....
9. Submitted for approval on: .....
10. Technical service responsible for conducting approval tests: .....
11. Date of report issued by that service: .....
12. Number of report issued by that service: .....
13. Remarks: .....
14. Approval granted/extended/refused/withdrawn 2/ .....
15. Place: .....
16. Date: .....
17. Signature: .....
18. The following documents, bearing the approval number shown above, are available on request .....

1/ Distinguishing number of the country which has granted/extended/refused/withdrawn approval (see approval provisions in the Regulation).

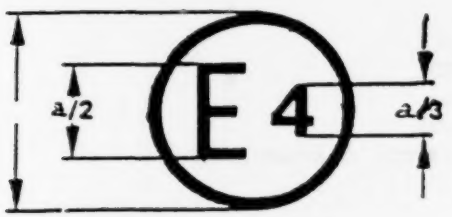
2/ Strike out what does not apply.

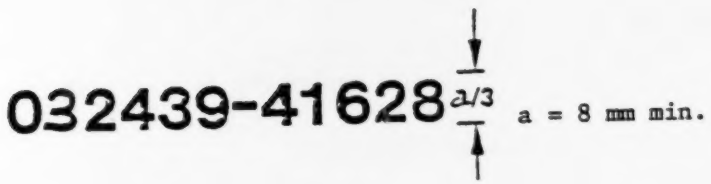
Annex 2 A

I. PROTECTIVE HELMET

EXAMPLE OF THE ARRANGEMENT OF APPROVAL MARK FOR A PROTECTIVE HELMET WITHOUT OR WITH ONE OR MORE TYPES OF VISOR

(See paragraph 5.1 of this Regulation)





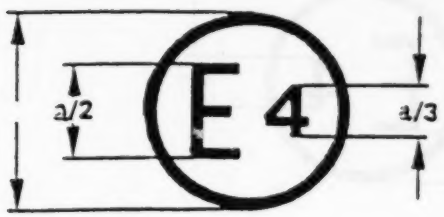
The above approval mark affixed to a protective helmet shows that the helmet type concerned has been approved in the Netherlands (E4) under approval number 032439. The approval number shows that approval was granted in accordance with the requirements of the Regulation already incorporating the 03 series of amendments at the time of approval, and that its production serial number is 41628.

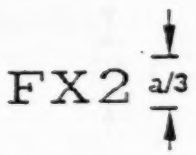
Note: The approval number and the production serial number shall be placed close to the circle and either above or below the letter "E" or to the left or right of that letter. The digits of the approval number and of the production serial number shall be on the same side of the letter "E" and face the same direction. The use of Roman numerals as approval numbers should be avoided so as to prevent any confusion with other symbols.

II. VISOR

EXAMPLE OF THE ARRANGEMENT OF APPROVAL MARK FOR A VISOR FITTED TO A PROTECTIVE HELMET

(See paragraph 5.1 of this Regulation)





a = 8 mm min.

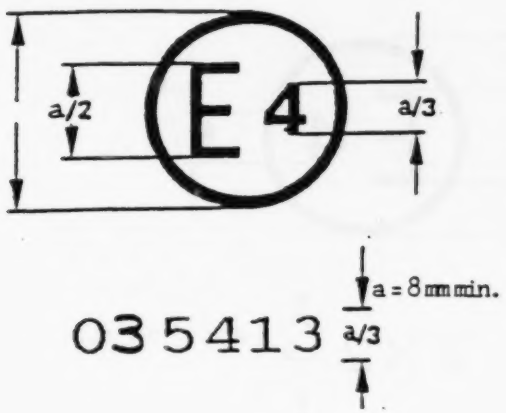
The above approval mark affixed to a visor shows that the visor concerned has been approved in the Netherlands (E4) under reference FX2, and that it forms an integral part of an approved helmet.

Note: The visor reference shall be placed close to the circle and either above or below the letter "E" or to the left or right of that letter. The reference symbols shall face the same direction. The use of numerals alone for the reference should be avoided so as to prevent any confusion with other symbols.

Annex 2 B

EXAMPLE OF THE ARRANGEMENT OF THE APPROVAL MARK FOR A HELMET VISOR

(See paragraph 5.2.7 of this Regulation)

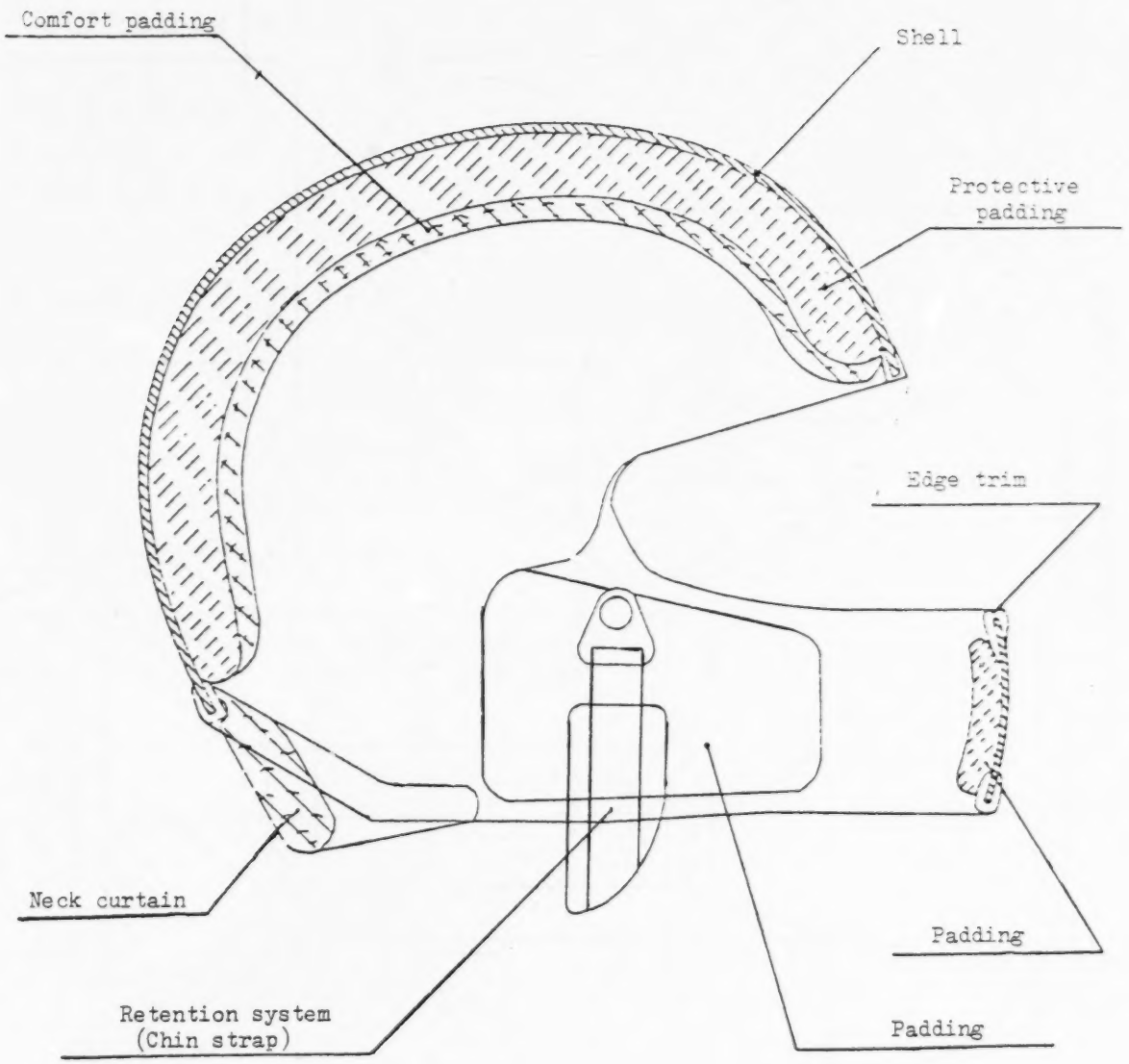


The above approval mark affixed to a visor shows that the visor type concerned has been approved in the Netherlands (E4) under approval number 035413. The approval number shows that approval was granted in accordance with the requirements of the Regulation incorporating the 03 series of amendments at the time of approval.

Note: The approval number shall be placed close to the circle and either above or below the letter "E" or to the left or right of that letter. The digits of the approval number shall be on the same side of the letter "E" and face the same direction. The use of Roman numerals as approval numbers should be avoided so as to prevent any confusion with other symbols.

Annex 3

DIAGRAM OF PROTECTIVE HELMET



HEADFORMS

FIG.1 - MINIMUM EXTENT OF PROTECTION

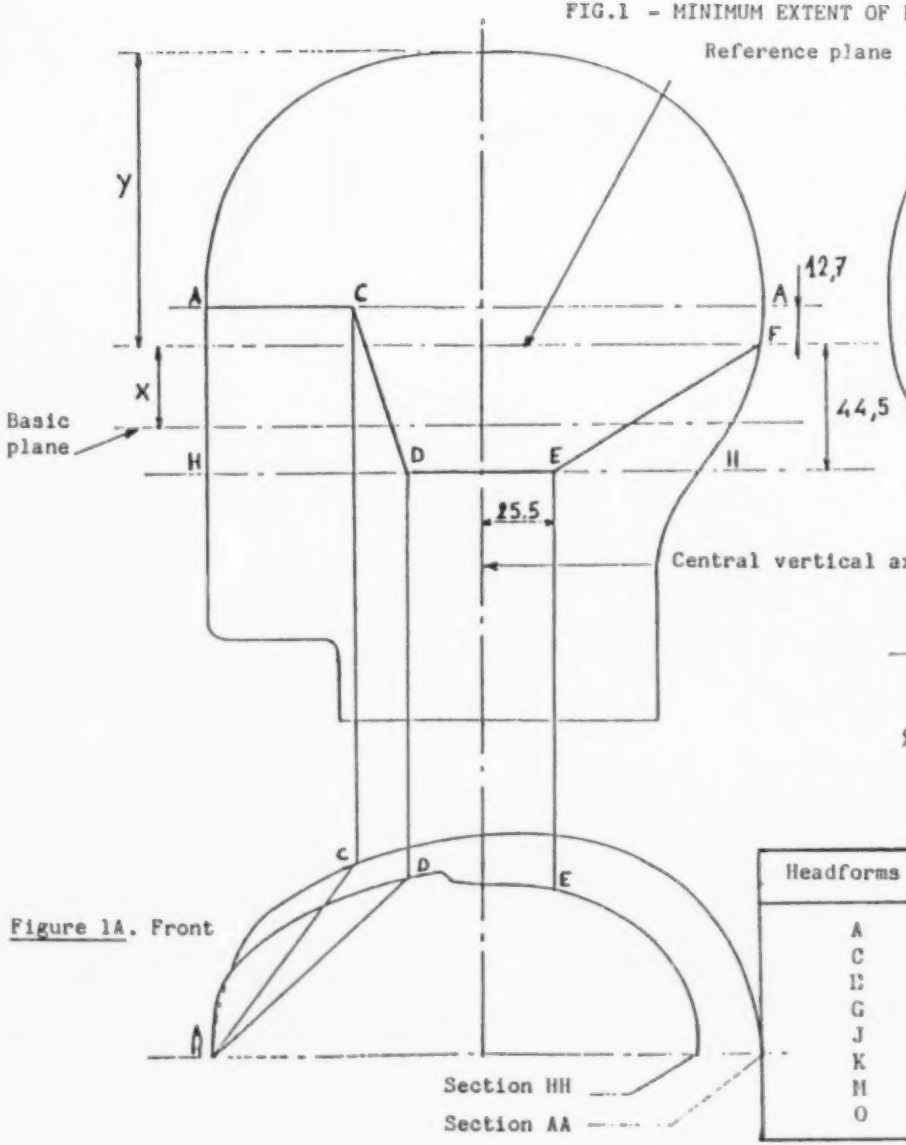


Figure 1A. Front

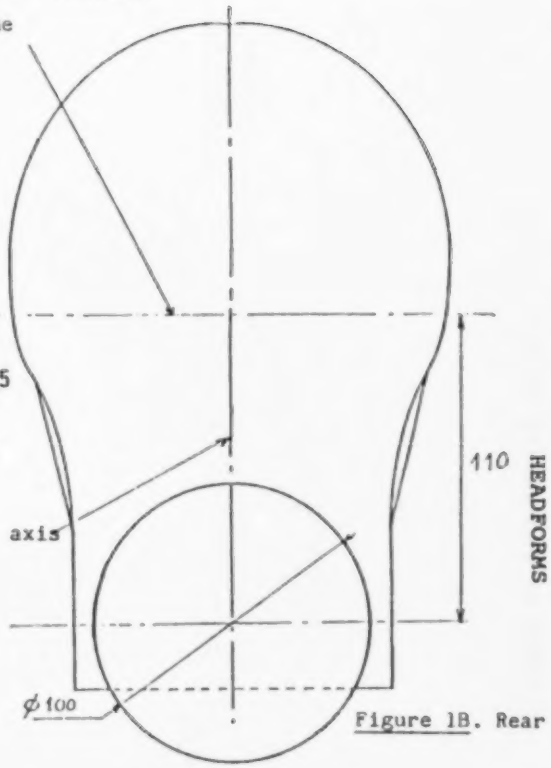


Figure 1B. Rear

Dimensions in mm

Headforms	Size	X	Y	AC	HD
A	50	24	90	80	88
C	52	25	93	82	90
E	54	26	96	84	92
G	56	27	99	86	94
J	57	27.5	102.5	87	95
K	58	28	104	88	96
M	60	29	107	90	98
O	62	30	110	92	100

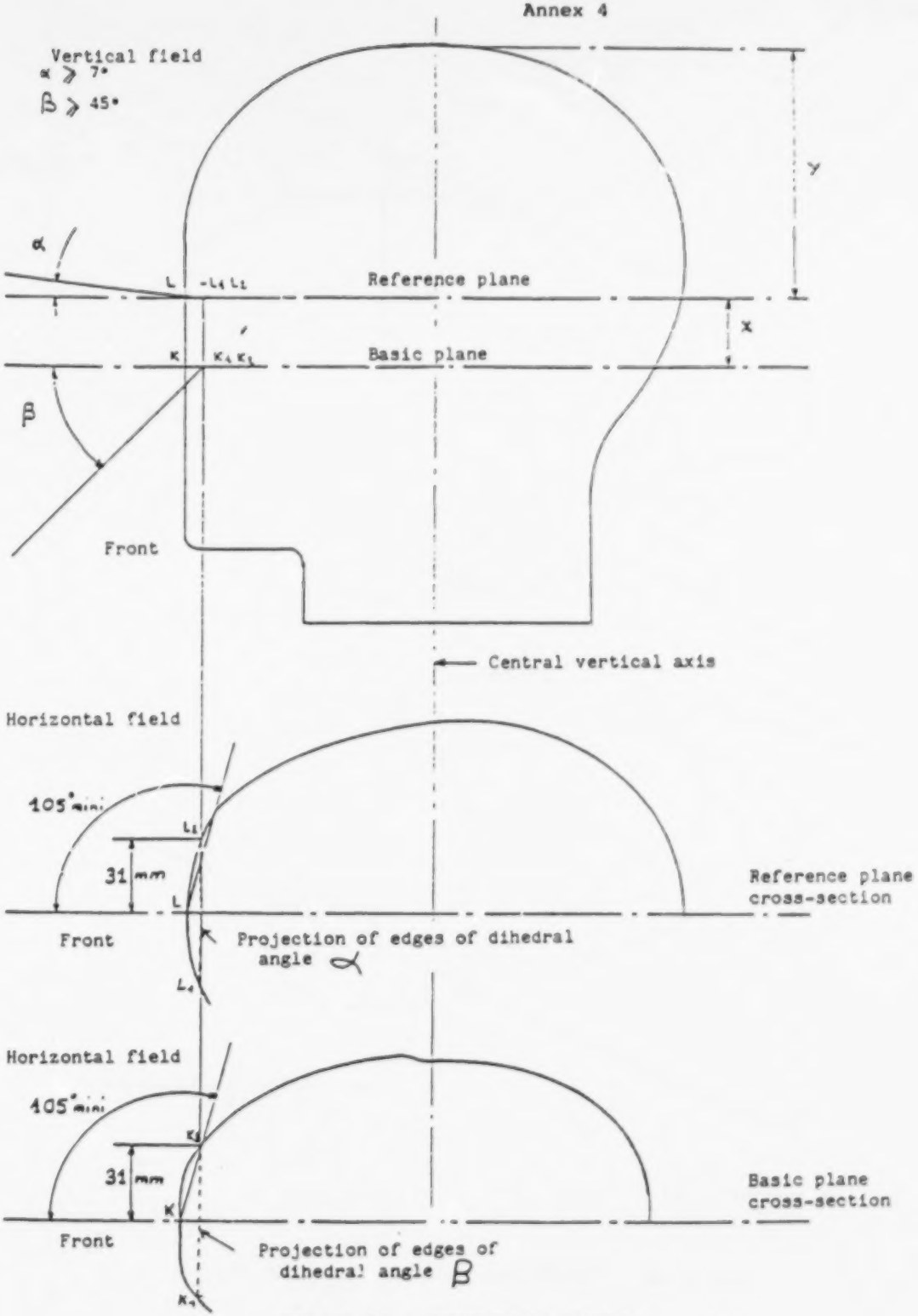


Figure 2A - PERIPHERAL VISION

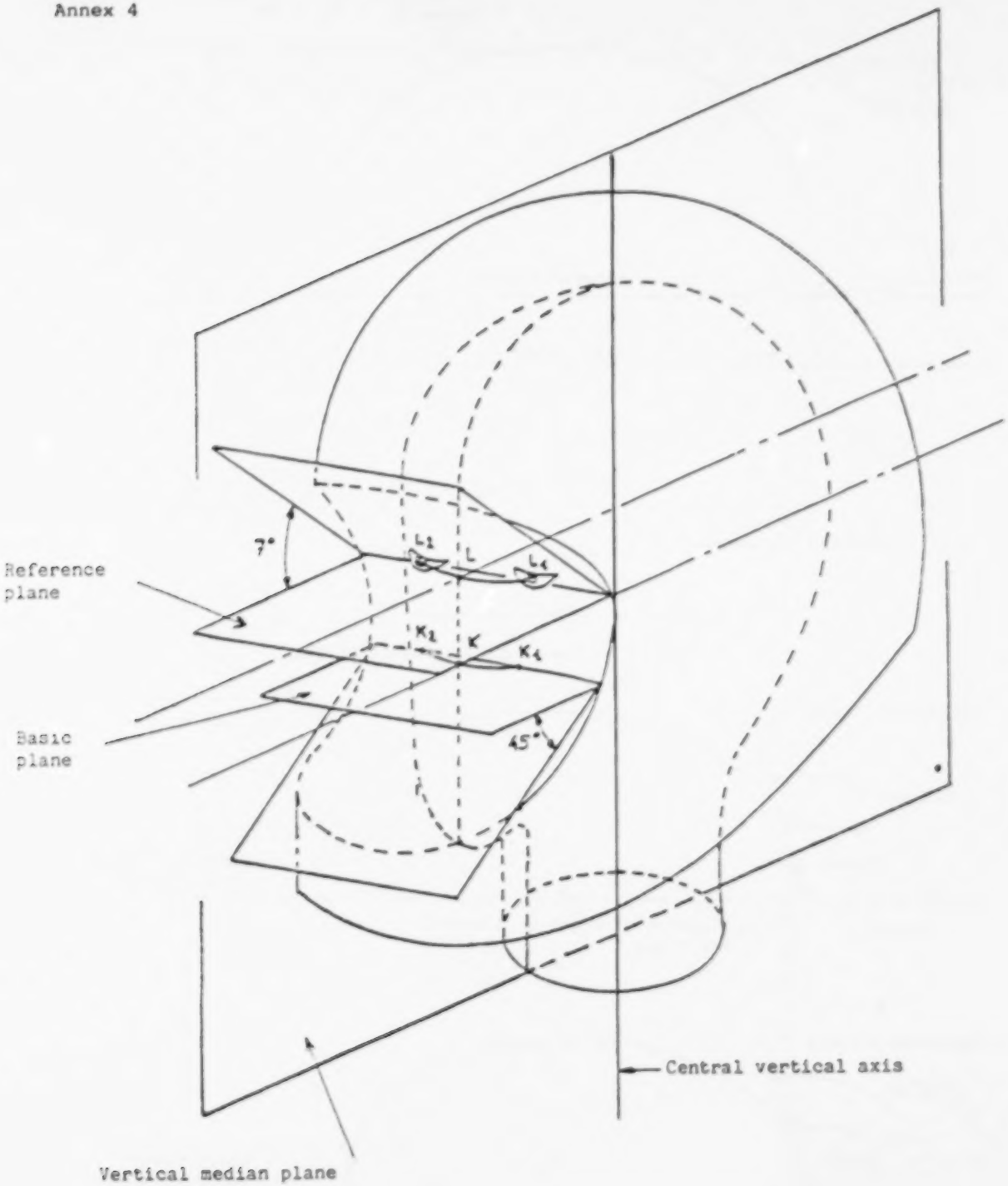


Figure 2B - PERIPHERAL VISION - VERTICAL FIELD

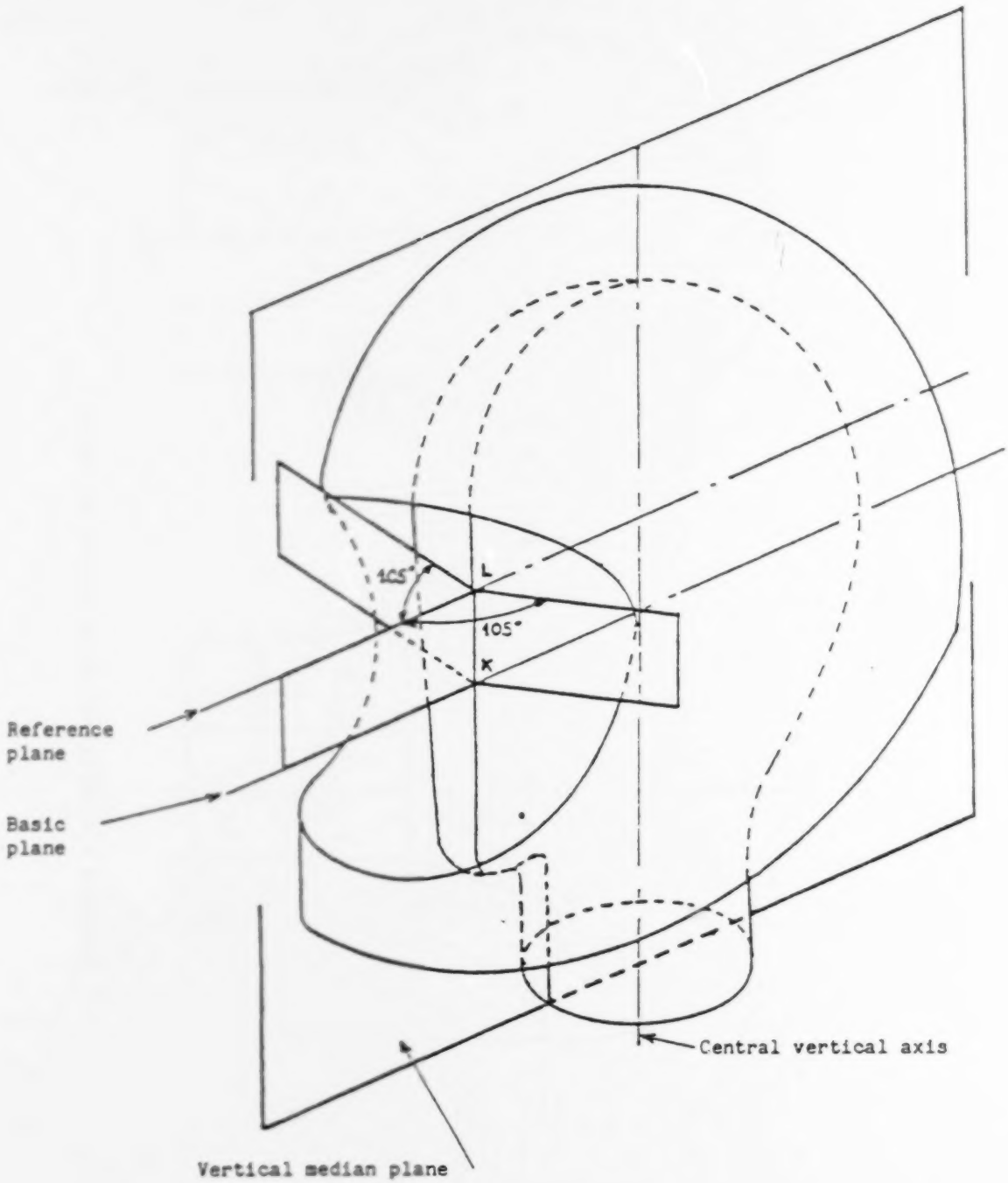


Figure 2C - PERIPHERAL VISION - HORIZONTAL FIELD

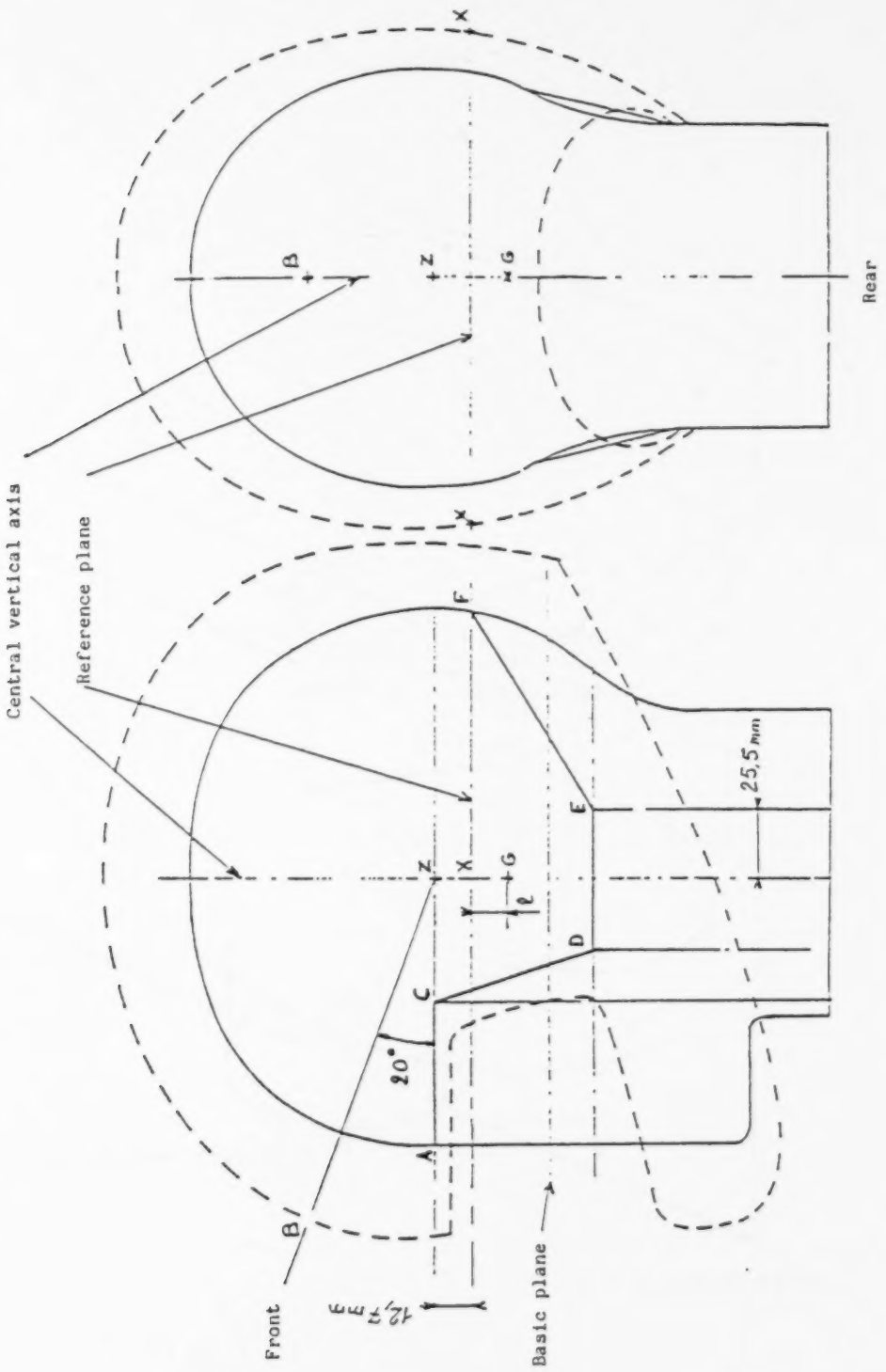


Figure 3 - IDENTIFICATION OF POINTS OF IMPACT

Annex 5

POSITIONING OF THE HELMET ON THE HEADFORM

1. The helmet is placed on a headform of appropriate size. A load of 50 N is applied on the crown of the helmet in order to adjust the helmet on the headform. It is ascertained that the vertical median plane of the helmet coincides with the median vertical plane of the headform.

2. The front edge of the helmet is placed against a gauge to check the minimum angle for the upward field of vision. The following points are then checked:

2.1 that the line AC and the ACDEF zone are covered by the shell (annex 4, fig. 1);

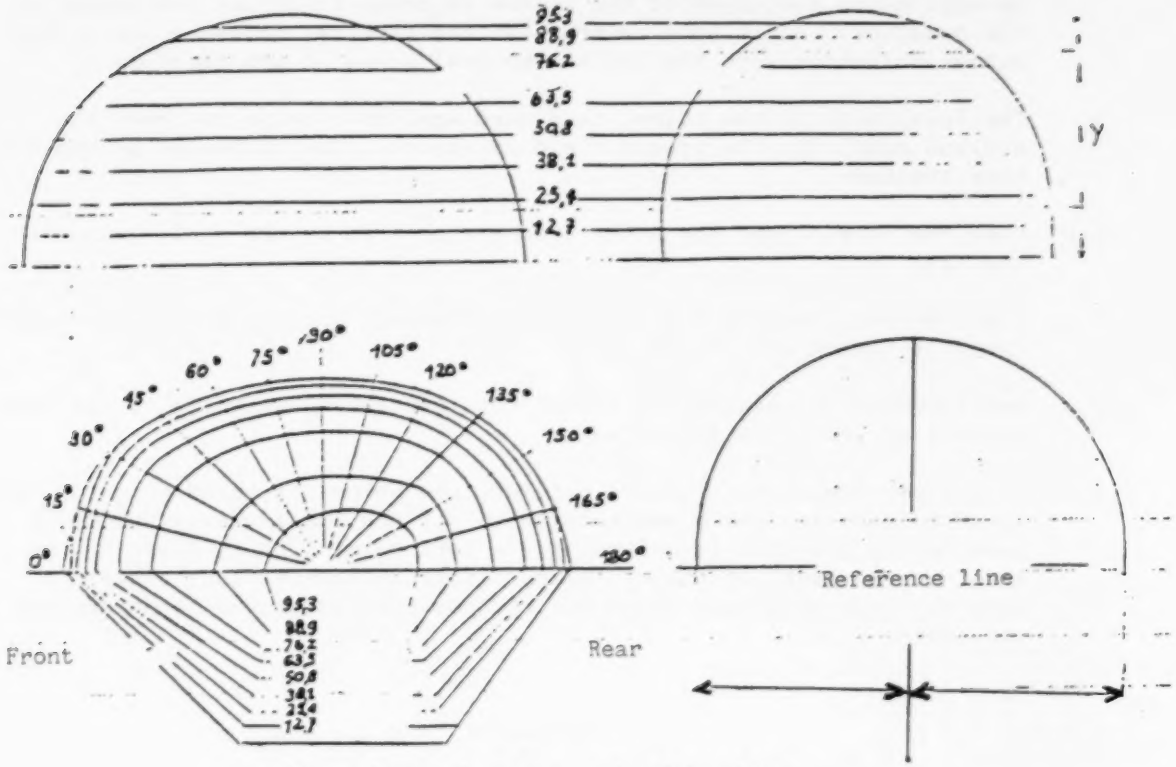
2.2 that the requirements for the minimum downward angle and the horizontal field of vision are satisfied;

2.3 Requirements of paragraph 6.4.2 of this Regulation relating to the rear projection should be respected.

3. If one of these conditions is not met, the helmet is moved slightly from front to rear to seek a position where all the requirements are met. Once such a position is determined, a horizontal line is drawn on the shell at the level of the AA' plane. This horizontal line shall determine the reference plane for the positioning of the helmet during the tests.

Annex 6

REFERENCE HEADFORMS
(shape, dimensions above reference plane)
Dimensions in millimetres



Dimensions of upper part of headforms
(to be consulted in conjunction with annex 4, fig. 3)

	A												
Height above reference line	0° Front	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°

Dimensions in millimetres

0	88.1	86.4	83.1	75.4	69.9	66.8	66.5	69.3	73.4	78.8	84.1	87.6	88.1
12.7	86.9	85.3	83.1	75.4	69.9	66.8	66.5	69.3	73.4	78.8	84.1	87.6	88.1
25.4	84.6	83.6	82.3	75.4	69.9	66.8	66.5	69.3	73.4	78.8	84.1	86.1	86.1
38.1	80.8	80.3	79.5	72.9	67.6	65.3	65.0	67.6	71.6	76.5	81.3	82.8	82.8
50.8	74.7	74.4	74.0	68.1	63.2	61.0	60.7	63.2	66.8	71.6	73.7	76.7	76.7
63.5	64.8	64.8	64.8	59.9	55.6	53.3	53.1	55.4	59.2	63.5	67.6	67.6	67.6
76.2	45.7	45.7	45.5	43.4	41.4	40.4	40.4	42.4	46.2	50.5	54.6	54.6	54.6
82.6	31.0	31.2	31.2	31.0	30.0	29.7	30.2	32.5	36.1	40.4	43.9	44.5	44.5

Dimension Y : 89.7 mm - Head circumference ≥ 500 mm

C

Height above reference line	0° Front	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180° Rear
	Dimensions in millimetres												
0	91.2	89.7	86.1	78.7	72.6	69.9	69.6	72.4	76.7	82.0	87.4	90.4	91.2
12.7	89.9	88.6	86.1	78.7	72.6	69.9	69.6	72.4	76.7	82.0	87.4	90.4	91.2
25.4	87.6	87.1	85.3	78.7	72.6	69.9	69.6	72.4	76.7	82.0	87.4	89.2	89.9
38.1	84.6	83.8	82.3	76.5	70.6	68.1	68.1	70.6	74.7	79.8	84.3	85.6	86.4
50.8	78.5	78.2	77.5	72.4	66.5	64.3	64.3	66.5	70.4	75.4	79.5	80.3	80.8
63.5	69.3	69.1	69.1	64.5	59.4	57.2	57.4	59.7	63.5	68.3	71.9	71.9	71.9
76.2	52.3	52.3	52.3	49.3	46.2	45.2	45.7	48.0	51.6	56.1	59.4	59.7	59.9
82.6	39.9	39.9	39.9	38.1	37.1	36.6	36.8	38.6	41.9	46.2	50.5	51.1	51.3
88.9	20.6	20.6	20.6	21.3	22.1	22.9	23.9	25.4	28.2	31.8	34.3	34.5	34.5
Dimension Y : 92.7 - Head circumference : 540 mm													

E

Height above reference line	0° Front	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180° Rear
	Dimensions in millimetres												
0	94.5	93.0	89.7	82.0	76.2	73.2	72.9	75.7	79.8	84.8	90.7	93.7	94.5
12.7	93.2	91.9	89.7	82.0	76.2	73.2	72.9	75.7	79.8	84.8	90.7	93.7	94.5
25.4	91.2	90.7	88.9	82.0	76.2	73.2	72.9	75.7	79.8	84.8	90.7	92.7	93.0
38.1	87.6	87.9	85.9	80.0	74.7	71.6	71.4	74.2	77.7	82.6	88.6	89.2	89.2
50.8	82.0	82.3	81.0	75.4	70.4	67.8	67.6	70.4	73.9	79.0	83.8	84.3	84.3
63.5	73.4	73.7	73.4	68.6	64.0	61.5	61.2	63.5	67.1	71.9	76.5	76.5	76.5
76.2	57.7	57.9	58.2	55.9	52.6	50.5	50.3	52.1	55.1	59.7	64.5	64.8	64.8
82.6	46.5	46.5	46.5	45.2	43.2	42.4	42.9	44.4	47.5	52.3	56.4	56.9	56.6
88.9	30.5	30.5	30.7	31.0	31.2	31.2	31.8	33.3	36.8	40.4	43.9	44.2	44.2
Dimension Y : 96 mm - Head circumference : 540 mm													

G

Height above reference line	0° Front	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180° Rear
	Dimensions in millimetres												
0	97.5	95.8	93.0	85.1	79.5	76.2	75.9	78.5	83.1	88.4	94.0	97.0	97.5
12.7	96.3	95.3	92.7	85.1	79.5	76.2	75.9	78.5	83.1	88.4	94.0	97.0	97.5
25.4	93.7	92.7	91.4	85.1	79.5	76.2	75.9	78.5	83.1	88.4	94.0	95.8	96.3
38.1	90.4	89.7	88.9	83.3	77.7	75.2	74.9	77.0	81.3	86.6	91.7	92.7	93.0
50.8	86.1	85.6	84.6	79.0	73.7	71.1	70.9	73.2	78.0	82.8	87.1	87.9	88.1
63.5	77.5	77.2	76.5	72.1	67.3	64.5	64.3	66.5	70.9	75.9	79.0	79.0	80.0
76.2	63.8	63.8	64.0	61.2	57.4	54.9	54.9	56.9	61.5	66.5	68.8	69.1	69.1
88.9	39.9	39.6	39.6	39.1	38.4	37.8	38.4	40.4	44.2	49.8	52.8	53.1	53.1
95.3	20.6	20.6	20.6	21.3	22.4	23.4	23.9	25.4	28.7	33.6	37.8	39.1	39.1
Dimension Y : 99.1 mm - Head circumference : 560 mm													

J													
Height above reference line	0° Front	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180° Rear
Dimensions in millimetres													
0	100.8	98.8	96.3	88.1	82.0	79.5	79.2	82.0	85.9	91.7	96.8	100.1	100.8
12.7	99.6	98.0	95.8	88.1	82.0	79.5	79.2	82.0	85.9	91.7	96.8	100.1	100.8
25.4	96.8	95.8	94.5	88.1	82.0	79.5	79.2	82.0	85.9	91.7	96.5	98.3	98.8
38.1	93.7	92.7	91.9	86.1	80.0	77.2	77.7	80.0	83.8	89.4	94.5	95.8	96.0
50.8	89.2	88.6	87.9	82.0	76.2	73.9	74.4	77.0	80.5	85.9	90.4	90.9	90.9
63.5	81.5	80.8	81.0	75.9	70.6	68.1	68.3	71.1	71.4	79.5	83.8	84.1	84.1
76.2	69.3	69.1	69.3	65.3	61.2	58.9	59.2	61.7	65.0	69.3	73.2	73.4	73.4
88.9	47.2	47.5	48.0	46.2	44.4	43.7	44.2	46.2	50.0	54.1	58.2	58.4	58.4
95.3	32.8	32.8	33.3	32.5	32.0	32.3	33.0	35.1	38.1	42.2	46.5	47.2	47.2
Dimension Y : 102.4 mm - Head circumference : 570 mm													

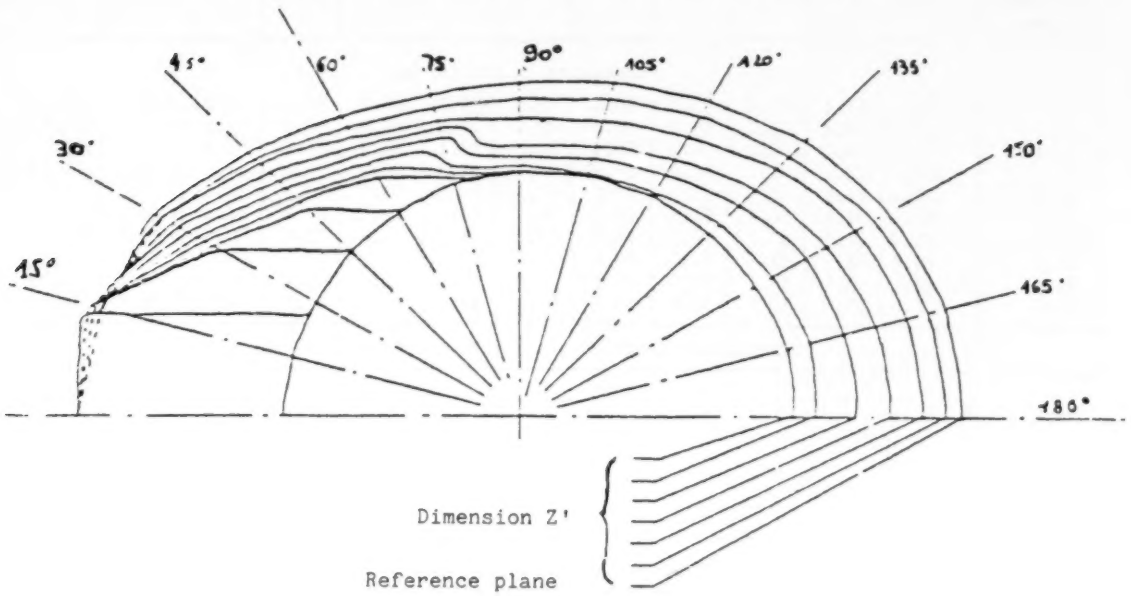
K													
Height above reference line	0° Front	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180° Rear
Dimensions in millimetres													
0	102.4	101.1	97.0	89.7	84.1	81.3	80.8	83.3	87.9	92.7	98.3	101.6	102.4
12.7	101.1	100.1	97.0	89.7	84.1	81.3	80.8	83.3	87.9	92.7	98.3	101.6	102.4
25.4	98.6	98.3	96.3	89.7	84.1	81.3	80.8	83.3	87.9	92.7	98.3	99.6	100.6
38.1	95.5	95.2	93.7	87.4	82.0	79.5	79.5	81.5	85.9	90.4	95.5	97.0	97.7
50.8	90.9	90.4	89.7	83.6	78.5	76.2	76.2	78.5	83.1	87.4	91.9	92.5	93.2
63.5	83.1	82.8	82.0	77.2	72.1	69.9	70.4	72.4	76.7	80.8	84.6	85.1	85.6
76.2	71.1	71.1	71.4	68.1	63.8	61.2	61.2	63.0	67.1	71.6	74.9	75.2	75.2
88.9	51.8	51.8	51.8	50.8	48.5	46.7	47.2	49.3	52.1	56.9	60.7	60.7	60.7
95.3	37.6	37.3	37.3	37.3	36.8	36.6	37.1	38.9	42.2	47.0	51.1	51.8	51.3
101.6	18.3	17.8	17.8	18.0	18.5	19.3	20.1	21.8	24.9	29.0	33.8	36.1	36.6
Dimension Y : 103.9 mm - Head circumference : 580 mm													

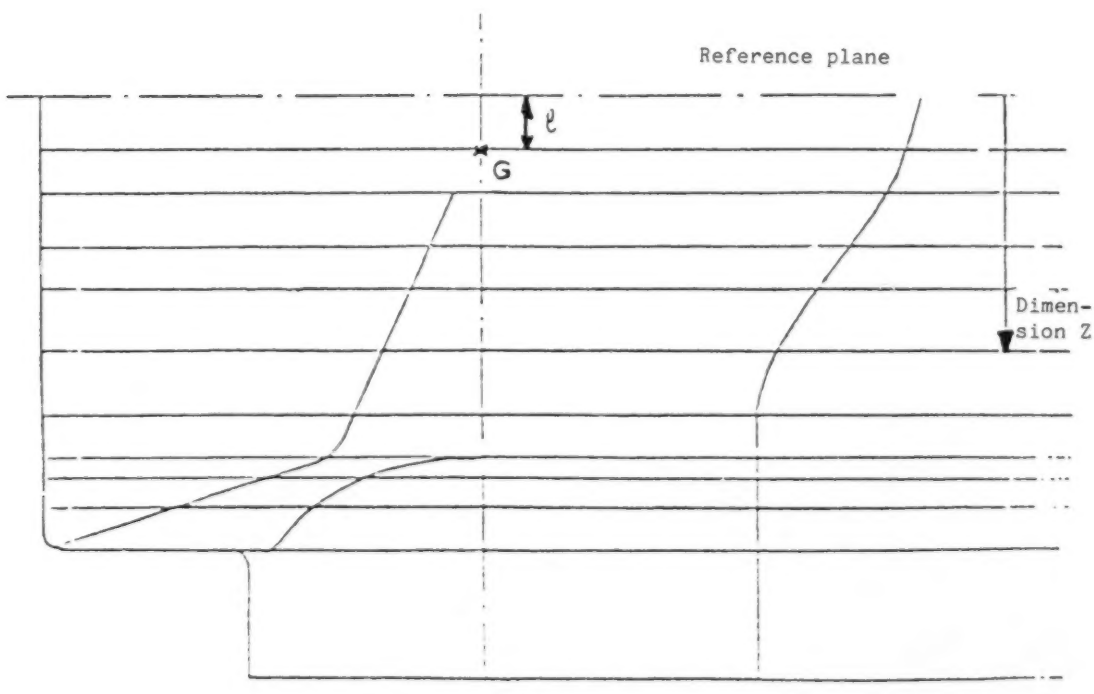
M													
Height above reference line	0° Front	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180° Rear
Dimensions in millimetres													
0	105.7	103.9	100.6	92.7	86.9	84.1	83.8	86.4	90.7	96.0	102.1	105.7	105.7
12.7	104.4	103.4	100.3	92.7	86.9	84.1	83.8	86.4	90.7	96.0	102.1	105.7	105.7
25.4	102.1	101.6	99.8	92.7	86.9	84.1	83.8	86.4	90.7	96.0	102.1	104.4	104.4
38.1	99.3	98.8	97.8	90.9	85.3	82.6	82.3	84.6	88.9	94.0	99.8	100.8	101.1
50.8	95.0	94.7	93.5	86.9	81.3	79.0	78.7	81.0	85.3	90.4	96.0	96.5	96.5
63.5	87.1	87.1	86.9	80.8	75.4	73.2	73.2	75.4	79.5	84.8	89.4	89.7	89.4
76.2	75.9	76.2	76.2	71.6	67.1	64.8	64.8	66.5	70.6	75.4	80.0	80.3	79.3
88.9	58.2	58.2	58.2	56.6	54.6	52.3	52.3	53.8	56.9	61.7	66.8	67.1	66.8
95.3	45.5	45.7	46.0	46.0	44.5	43.4	43.2	44.5	47.2	52.1	57.7	58.2	57.9
101.6	26.4	26.2	26.7	27.7	28.7	29.5	30.0	31.2	34.0	38.6	42.7	43.2	42.7
Dimension Y : 107.2 mm - Head circumference : 600 mm													

0													
Height above reference line	0° Front	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180° Rear
Dimensions in millimetres													
0	108.7	107.4	103.4	95.8	90.4	87.6	87.1	90.2	94.2	99.8	105.4	108.0	108.7
12.7	107.7	106.4	103.4	95.8	90.4	87.6	87.1	90.2	94.2	99.8	105.4	108.0	108.7
25.4	105.2	104.4	102.9	95.8	90.4	87.6	87.1	90.2	94.2	99.8	105.4	106.7	106.9
38.1	102.4	102.1	101.1	94.2	88.9	86.1	85.9	88.9	93.0	98.6	103.4	104.1	104.1
50.8	97.8	97.5	96.5	90.2	85.1	82.3	82.6	85.3	89.9	94.7	99.6	100.3	100.3
63.5	91.2	91.2	90.4	84.3	79.2	76.7	77.0	79.8	83.8	88.4	93.0	93.2	93.2
76.2	81.0	81.3	80.8	76.2	71.6	69.3	69.6	71.9	75.7	80.5	84.6	84.6	84.6
88.9	64.5	64.5	64.5	61.5	58.4	57.2	57.7	60.2	63.5	68.1	71.9	71.4	71.9
95.3	54.1	53.8	54.1	52.6	50.3	49.0	49.5	51.6	55.4	60.5	64.3	64.0	64.0
101.6	37.6	37.6	38.1	38.4	38.1	37.8	38.4	40.4	43.4	48.0	51.3	51.3	51.1
Dimension Y : 110.2 - Head circumference : 620 mm													

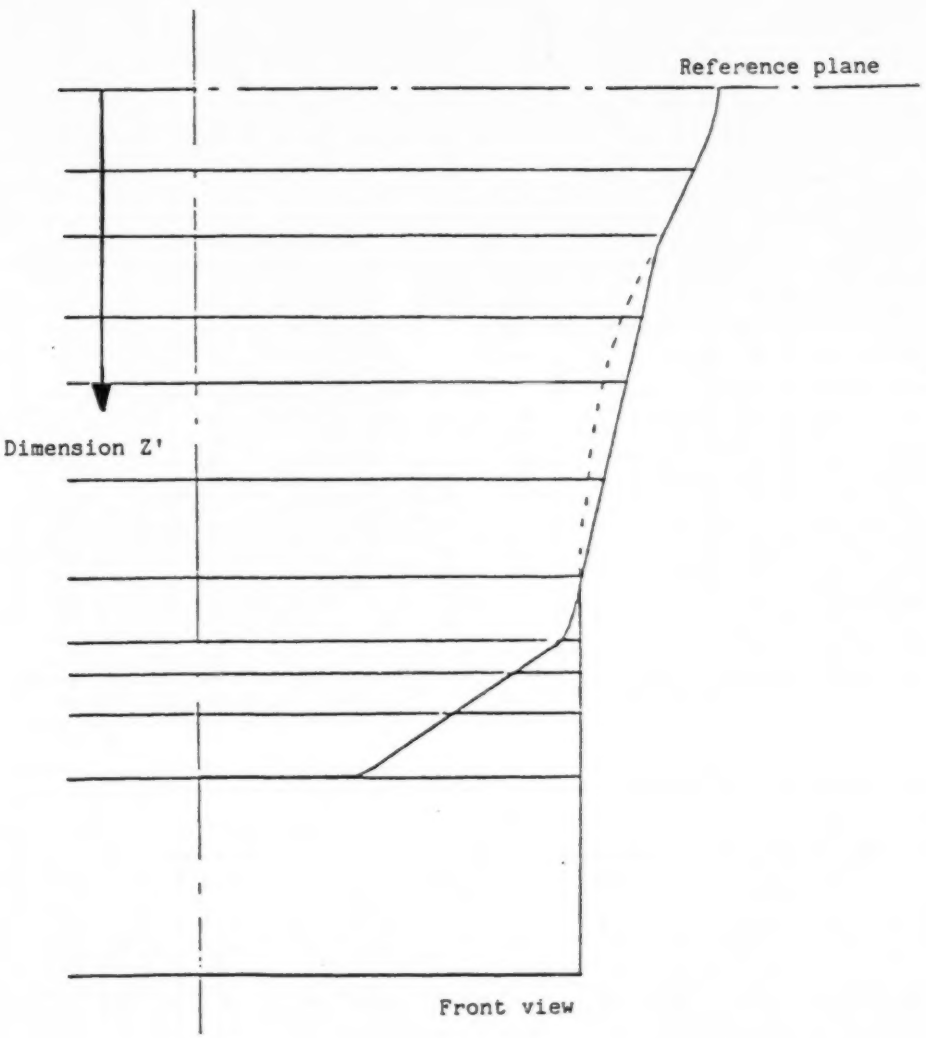
Annex 7

REFERENCE HEADFORMS
(shape, dimensions below reference plane)





Side view


Reference plane
Dimension Z'
Front view

A

Dimension Z'	0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180° Rear
0	88.0	86.5	85.0	75.5	70.0	67.0	66.5	69.5	73.5	78.5	84.0	87.0	88.0
- 11.1	88.0	86.5	82.5	74.5	68.5	66.0	66.0	68.5	72.0	77.0	81.5	84.5	85.0
- 19.9	88.0	88.0	82.5	74.0	66.5	65.0	65.0	64.5	67.5	72.5	77.0	80.0	80.5
- 30.8	88.0	89.5	81.0	71.5	65.0	62.0	56.0	58.0	61.5	66.5	71.0	73.5	74.0
- 39.4	88.0	89.5	79.0	69.0	63.0	60.0	54.0	55.0	58.0	61.5	65.0	67.5	67.0
- 52.3	88.0	89.5	77.0	67.0	60.5	54.0	51.5	52.0	53.5	56.5	59.0	60.0	58.5
- 65.6	88.0	89.5	75.5	65.0	58.5	52.5	50.5	51.0	51.5	52.5	53.0	54.0	54.5
- 74.4	88.0	89.5	73.5	62.5	56.0	51.0	50.5	51.0	51.5	52.5	53.0	54.0	54.5
- 78.8	88.0	89.5	71.5	60.5	49.5	50.0	50.5	51.0	51.5	52.5	53.0	54.0	54.5
- 81.4	88.0	89.5	69.5	47.5	49.5	50.0	50.5	51.0	51.5	52.5	53.0	54.0	54.5
- 92.3	88.0	92.0	47.5	47.5	49.5	50.0	50.5	51.0	51.5	52.5	53.0	54.0	54.5
-119.0	47.0	47.0	47.5	47.5	49.5	50.0	50.5	51.0	51.5	52.5	53.0	54.0	54.5

Dimension l : 11.1 mm Head circumference : 500 mm

C

Dimension Z'	0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180° Rear
0	91.5	89.5	86.0	79.0	72.5	70.0	69.5	72.5	77.0	82.0	87.5	90.5	91.5
- 11.5	91.5	89.5	85.5	77.0	71.0	68.5	68.5	71.0	74.5	80.0	84.5	87.5	88.0
- 20.6	91.5	91.0	85.5	76.5	69.0	65.5	64.0	66.5	70.0	75.5	80.0	83.0	83.5
- 31.8	91.5	92.5	84.0	74.0	67.0	64.5	58.0	60.5	64.0	69.0	73.5	76.0	76.5
- 40.9	91.5	92.5	81.5	71.5	65.5	62.0	56.0	57.0	60.0	64.0	67.5	70.0	69.5
- 54.4	91.5	92.5	80.0	69.5	62.5	56.0	53.5	54.0	55.5	58.5	61.0	62.0	61.0
- 68.0	91.5	92.5	78.0	67.0	61.0	54.5	52.0	53.0	53.5	54.5	55.0	56.0	56.5
- 77.2	91.5	92.5	76.0	65.0	60.0	52.5	52.0	53.0	53.5	54.5	55.0	56.0	56.5
- 81.7	91.5	92.5	74.0	62.5	51.0	51.5	52.0	53.0	53.5	54.5	55.0	56.0	56.5
- 87.9	91.5	92.5	72.0	49.5	51.0	51.5	52.0	53.0	53.5	54.5	55.0	56.0	56.5
- 96.2	91.5	92.5	49.0	49.5	51.0	51.5	52.0	53.0	53.5	54.5	55.0	56.0	56.5
-125.4	48.5	48.5	49.0	49.5	51.0	51.5	52.0	53.0	53.5	54.5	55.0	56.0	56.5

Dimension l : 11.5 mm Head circumference : 520 mm

E

Dimension Z'	0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180° Rear
0	94.5	93.0	90.0	82.0	76.5	73.5	73.0	76.0	80.0	85.0	91.0	94.0	94.5
- 11.9	94.5	93.0	88.5	79.5	73.0	70.5	70.5	73.0	77.0	82.5	87.0	90.5	91.0
- 21.8	94.5	94.0	88.5	79.0	71.0	67.5	66.0	69.0	72.0	77.5	82.5	85.5	86.0
- 32.3	94.5	95.5	86.5	76.5	69.5	66.5	60.0	62.5	66.0	71.0	76.0	78.5	79.0
- 42.1	94.5	95.5	84.5	74.0	67.5	64.0	57.5	59.0	62.0	66.0	70.0	72.0	71.5
- 56.2	94.5	95.5	82.5	71.5	64.5	57.5	55.5	55.5	57.0	60.5	63.0	64.0	63.0
- 70.2	94.5	95.5	80.5	69.5	62.5	56.0	54.0	55.0	55.5	56.0	56.5	57.5	58.0
- 79.6	94.5	95.5	79.5	67.0	62.0	54.5	54.0	55.0	55.5	56.0	56.5	57.5	58.0
- 84.5	94.5	95.5	76.5	64.5	53.0	53.5	54.0	55.0	55.5	56.0	56.5	57.5	58.0
- 90.4	94.5	95.5	74.5	51.0	53.0	53.5	54.0	55.0	55.5	56.0	56.5	57.5	58.0
- 99.3	94.5	98.5	50.5	51.0	53.0	53.5	54.0	55.0	55.5	56.0	56.5	57.5	58.0
-127.4	50.0	50.0	50.5	51.0	53.0	53.5	54.0	55.0	55.5	56.0	56.5	57.5	58.0

Dimension l : 11.9 mm Head circumference : 540 mm

G													
Dimension Z'	0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180° Rear
0	97.5	95.5	93.0	85.5	79.5	76.0	76.0	78.5	83.0	88.5	94.0	97.0	97.5
- 12.3	97.5	95.5	91.5	82.0	75.5	73.0	73.0	75.5	79.0	85.0	90.0	93.0	93.5
- 21.9	97.5	97.0	91.5	81.5	73.5	69.5	68.0	71.0	74.5	80.0	85.0	88.5	89.0
- 33.8	97.5	98.5	89.5	78.5	71.5	68.5	62.0	64.0	68.0	73.5	78.0	81.0	81.5
- 43.5	97.5	98.5	87.0	76.5	69.5	66.0	59.5	61.0	63.5	68.0	72.0	74.5	74.0
- 58.0	97.5	98.5	85.0	74.0	66.5	59.5	57.0	57.5	59.0	62.5	65.0	66.0	64.5
- 72.4	97.5	98.5	83.0	71.5	64.5	58.0	55.5	56.5	57.0	58.0	58.5	59.5	60.0
- 82.1	97.5	98.5	81.0	69.0	63.5	56.0	55.5	56.5	57.0	58.0	58.5	59.5	60.0
- 86.9	97.5	98.5	78.5	66.5	54.5	55.0	55.5	56.5	57.0	58.0	58.5	59.5	60.0
- 93.2	97.5	98.5	77.0	52.5	54.5	55.0	55.5	56.5	57.0	58.0	58.5	59.5	60.0
-102.4	97.5	101.5	52.0	52.5	54.5	55.0	55.5	56.5	57.0	58.0	58.5	59.5	60.0
-131.4	51.5	51.5	52.0	52.5	54.5	55.0	55.5	56.5	57.0	58.0	58.5	59.5	60.0
Dimension l : 12.3 mm								Head circumference : 560 mm					

J													
Dimension Z'	0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180° Rear
0	101.0	99.5	95.5	88.5	82.5	79.5	79.5	82.0	86.0	92.0	97.0	100.5	101.0
- 12.7	101.0	99.5	94.5	85.0	78.0	75.5	75.5	78.0	82.0	88.0	93.0	96.5	97.0
- 22.7	101.0	100.5	94.5	84.5	76.0	72.0	70.5	73.5	77.0	83.0	88.0	91.5	92.0
- 35.0	101.0	102.0	92.5	81.5	74.0	71.0	64.0	66.5	70.5	76.0	81.0	84.0	84.5
- 45.0	101.0	102.0	90.0	79.0	72.0	68.5	61.5	63.0	66.0	70.5	74.5	77.0	76.5
- 60.0	101.0	102.0	88.0	76.5	69.0	61.5	59.0	59.5	61.0	64.5	67.5	68.5	67.0
- 75.0	101.0	102.0	86.0	74.0	67.0	60.0	57.5	58.5	59.0	60.0	60.5	61.5	62.0
- 85.0	101.0	102.0	84.0	71.5	66.0	58.0	57.5	58.5	59.0	60.0	60.5	61.5	62.0
- 90.0	101.0	102.0	81.5	69.0	56.5	57.0	57.5	58.5	59.0	60.0	60.5	61.5	62.0
- 96.5	101.0	102.0	79.5	54.5	56.5	57.0	57.5	58.5	59.0	60.0	60.5	61.5	62.0
-106.0	101.0	105.0	54.0	54.5	56.5	57.0	57.5	58.5	59.0	60.0	60.5	61.5	62.0
-136.0	53.5	53.5	54.0	54.5	56.5	57.0	57.5	58.5	59.0	60.0	60.5	61.5	62.0
Dimension l : 12.7 mm								Head circumference : 570 mm					

K													
Dimension Z'	0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180° Rear
0	102.5	101.0	97.0	90.0	84.0	81.5	81.0	83.5	88.0	93.0	98.5	101.5	102.5
- 12.9	102.5	101.0	96.0	86.0	79.0	76.5	76.5	79.0	83.0	89.5	94.5	98.0	98.5
- 23.0	102.5	102.0	96.0	86.0	77.0	73.0	71.5	74.5	78.0	84.0	89.5	93.0	93.5
- 35.5	102.5	103.5	94.0	82.5	75.0	72.0	65.0	67.5	71.5	77.0	82.0	85.0	85.5
- 45.7	102.5	103.5	91.5	80.0	73.0	63.5	62.5	64.0	67.0	71.5	75.5	78.0	77.5
- 60.9	102.5	103.5	89.5	77.5	70.0	62.5	60.0	60.5	62.0	65.5	68.5	69.5	68.0
- 76.1	102.5	103.5	87.5	75.0	68.0	61.0	58.5	59.5	60.0	61.0	61.5	62.5	63.0
- 86.2	102.5	103.5	85.5	72.5	67.0	59.0	58.5	59.5	60.0	61.0	61.5	62.5	63.0
- 91.3	102.5	103.5	82.5	70.0	57.5	58.0	58.5	59.5	60.0	61.0	61.5	62.5	63.0
- 97.9	102.5	103.5	80.5	55.5	57.5	58.0	58.5	59.5	60.0	61.0	61.5	62.5	63.0
-107.6	102.5	106.5	54.5	55.5	57.5	58.0	58.5	59.5	60.0	61.0	61.5	62.5	63.0
-138.0	54.5	54.5	54.5	55.5	57.5	58.0	58.5	59.5	60.0	61.0	61.5	62.5	63.0
Dimension l : 12.9 mm								Head circumference : 580 mm					

M

Dimension Z'	0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180° Rear
0	106.0	104.0	101.0	93.5	87.0	84.5	84.0	86.5	91.0	96.0	102.0	106.0	106.0
- 13.3	106.0	104.0	98.5	88.5	81.5	79.0	79.0	81.5	85.5	92.0	97.0	100.5	101.5
- 23.7	106.0	105.0	98.5	88.0	79.5	75.0	73.5	76.5	80.5	86.5	92.0	95.5	96.0
- 36.5	106.0	106.5	96.5	85.0	77.5	74.0	67.0	69.5	73.5	79.5	84.5	87.5	88.0
- 47.0	106.0	106.5	94.0	82.5	75.0	71.5	64.0	66.0	69.0	73.5	78.0	80.5	80.0
- 62.6	106.0	106.5	92.0	80.0	72.0	64.0	61.5	62.0	63.5	67.5	70.5	71.5	70.0
- 78.3	106.0	106.5	90.0	77.0	70.0	62.5	60.0	61.0	61.5	62.5	63.0	64.0	64.5
- 88.7	106.0	106.5	87.5	74.5	69.0	60.5	60.0	61.0	61.5	62.5	63.0	64.0	64.5
- 94.0	106.0	106.5	85.0	72.0	59.0	59.5	60.0	61.0	61.5	62.5	63.0	64.0	64.5
-100.7	106.0	106.5	83.0	57.0	59.0	59.5	60.0	61.0	61.5	62.5	63.0	64.0	64.5
-110.7	106.0	109.5	56.5	57.0	59.0	59.5	60.0	61.0	61.5	62.5	63.0	64.0	64.5
-142.0	56.0	56.0	56.5	57.0	59.0	59.5	60.0	61.0	61.5	62.5	63.0	64.0	64.5

Dimension 1 : 13.3 mm Head circumference : 600 mm

O

Dimension Z'	0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180° Rear
0	108.5	107.5	103.5	96.0	90.5	87.5	87.0	90.0	94.5	100.0	105.0	108.0	108.5
- 13.7	108.5	107.5	101.5	91.5	84.0	81.0	81.0	84.0	88.0	94.5	100.0	103.5	104.5
- 24.4	108.5	108.0	101.5	91.0	81.5	77.5	76.0	79.0	83.0	89.0	94.5	98.5	99.0
- 37.6	108.5	109.5	99.5	87.5	79.5	76.5	63.0	71.5	76.0	81.5	87.0	90.5	91.0
- 48.4	108.5	109.5	97.0	85.0	77.5	73.5	66.0	67.5	71.0	76.0	80.0	83.5	82.0
- 64.5	108.5	109.5	94.5	82.0	74.0	66.0	63.5	64.0	65.5	69.5	72.5	73.5	72.0
- 80.6	108.5	109.5	92.5	79.5	72.0	64.5	62.0	63.0	63.5	64.5	65.0	66.0	66.5
- 91.4	108.5	109.5	90.5	77.0	71.0	62.5	62.0	63.0	63.5	64.5	65.0	66.0	66.5
- 96.8	108.5	109.5	87.5	74.0	60.5	61.0	62.0	63.0	63.5	64.5	65.0	66.0	66.5
-103.8	108.5	109.5	85.5	58.5	60.5	61.0	62.0	63.0	63.5	64.5	65.0	66.0	66.5
-114.0	108.5	113.0	58.0	58.5	60.5	61.0	62.0	63.0	63.5	64.5	65.0	66.0	66.5
-146.2	57.5	57.5	58.0	58.5	60.5	61.0	62.0	63.0	63.5	64.5	65.0	66.0	66.5

Dimension 1 : 13.7 mm Head circumference : 620 mm

Annex 8

TEST MACHINES

HEADFORM - DROP ASSEMBLY

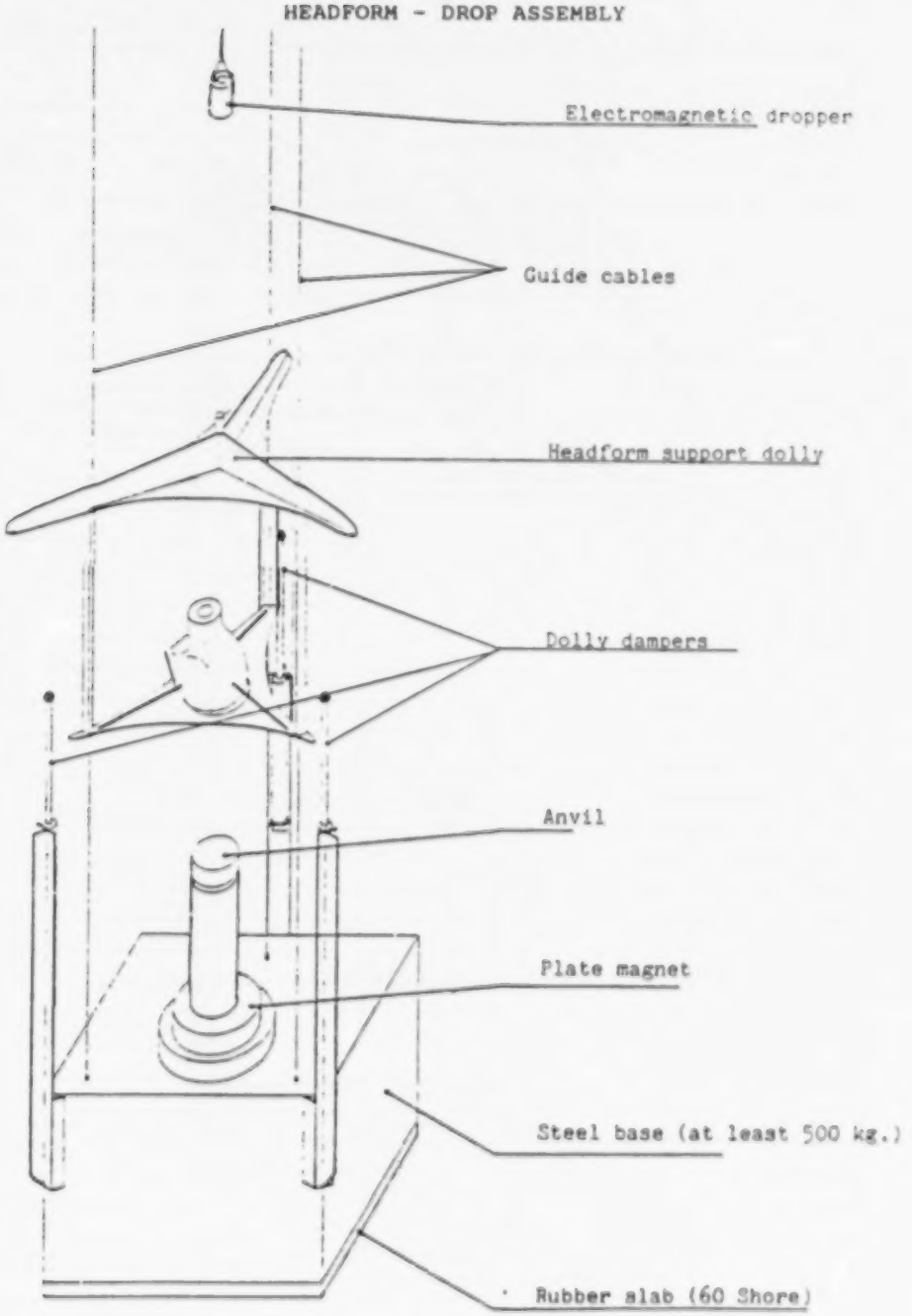


Figure 1

DYNAMIC TEST OF RETENTION SYSTEM

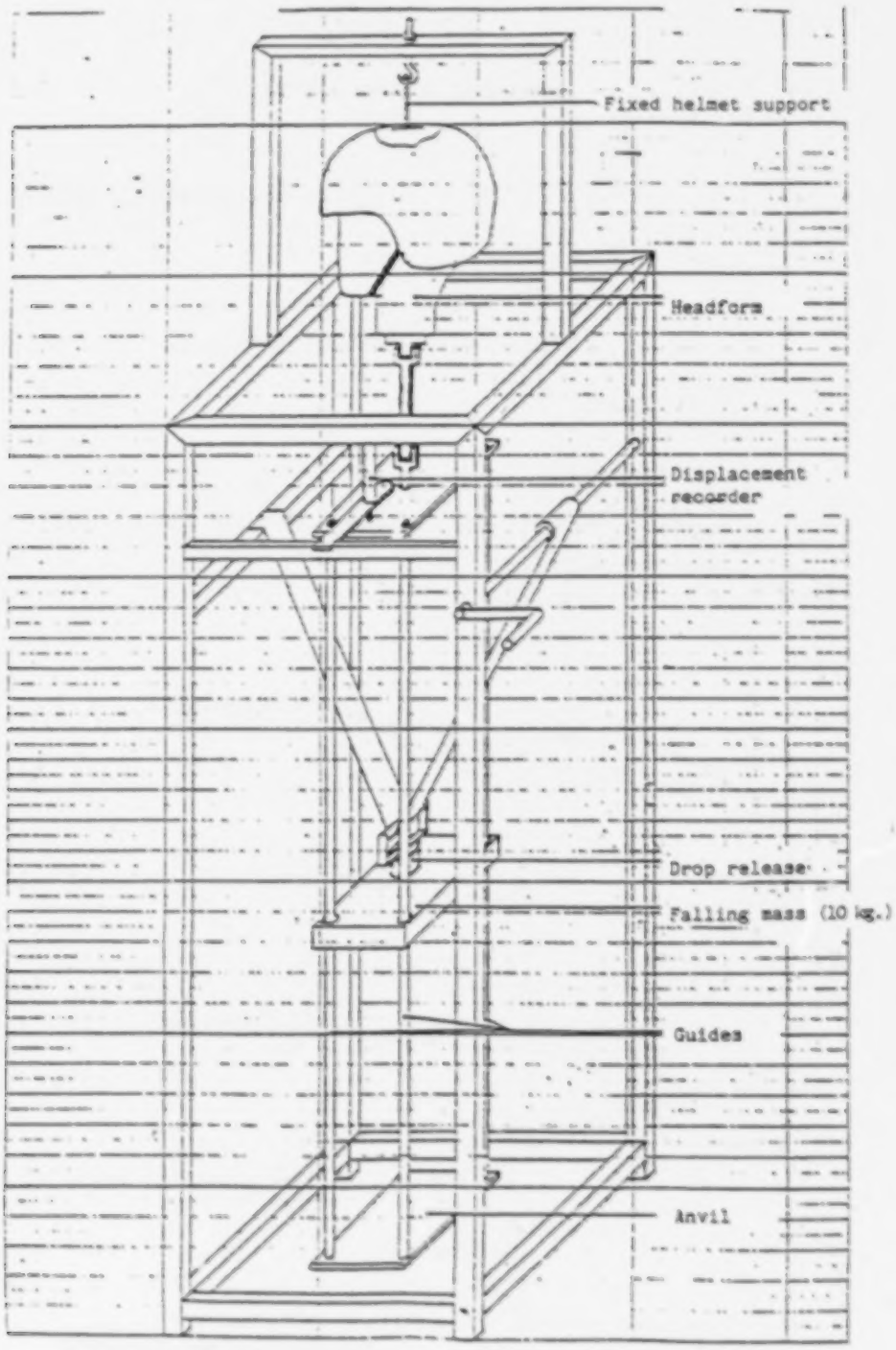


Figure 2

RETENTION (DETACHING) TEST APPARATUS

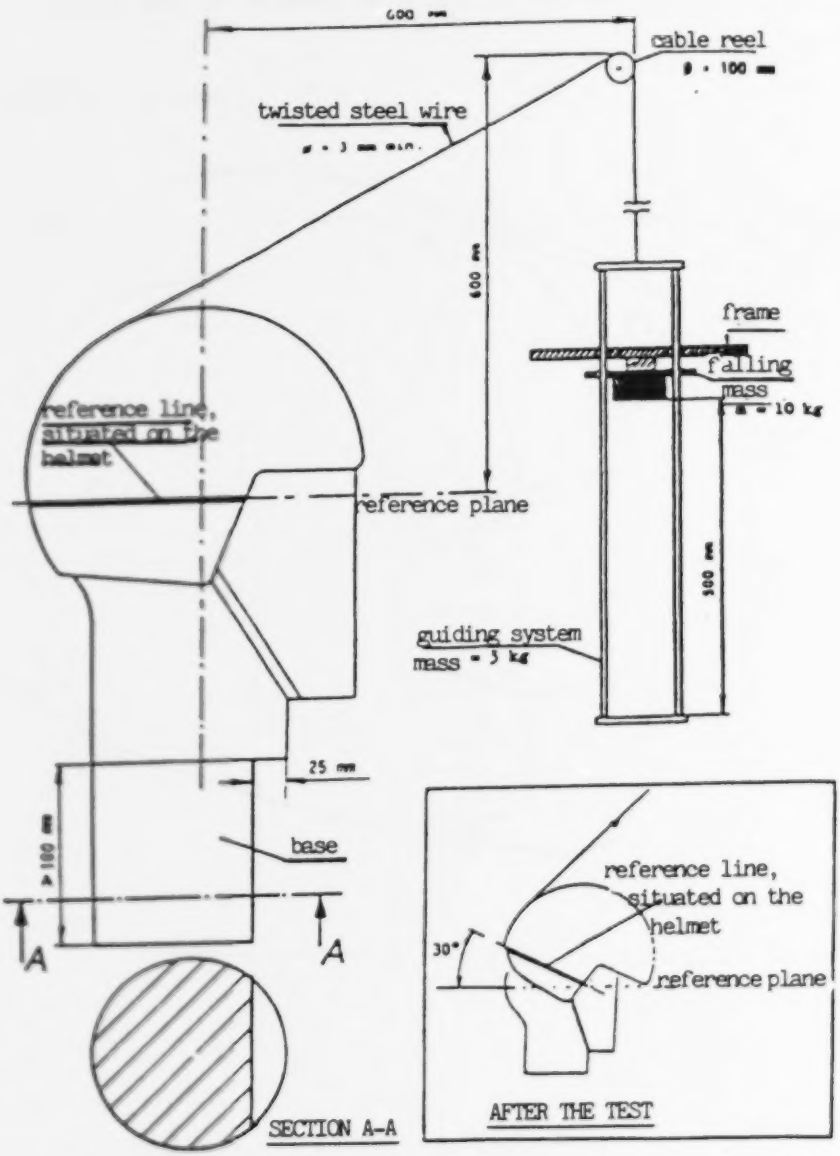
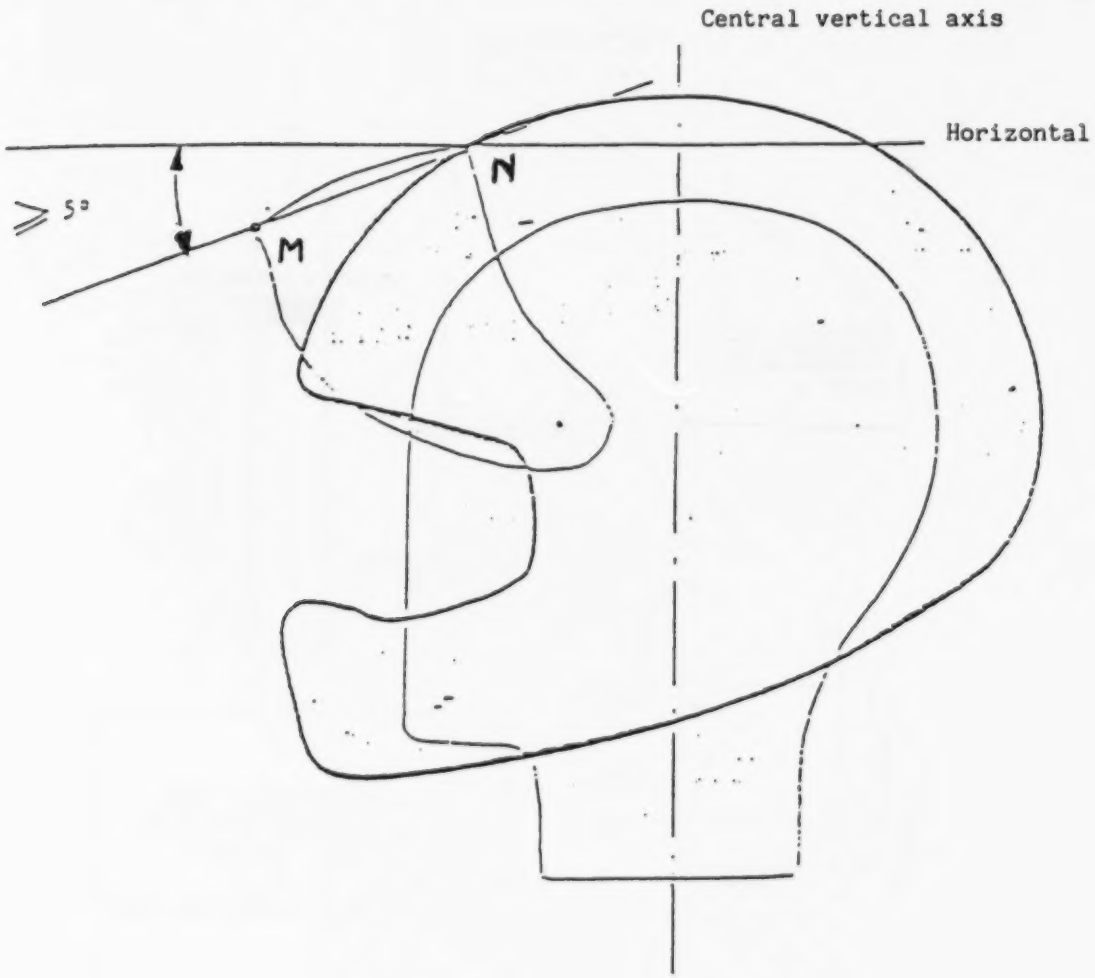


Figure 3

Annex 9

TESTING OF THE ANGLE OF OPENING OF THE VISOR



The secant line MN is the straight line joining the points of the upper and lower edges of the visor contained in the median vertical plane of the helmet.

Annex 10

ABRASION TEST PROCEDURE

1. DESCRIPTION OF THE TEST EQUIPMENT

The sand spray test equipment consists essentially of that illustrated in Figure 1. The gravity tube consists of three separate rigid polyvinylchloride tubes (PVC hard) of the same diameter, with two polyamide sieves mounted in between. The sieves should have a mesh size of 1.6 mm. The speed of the turntable shall be 250 ± 10 r.p.m.

2. ABRASIVE MATERIAL

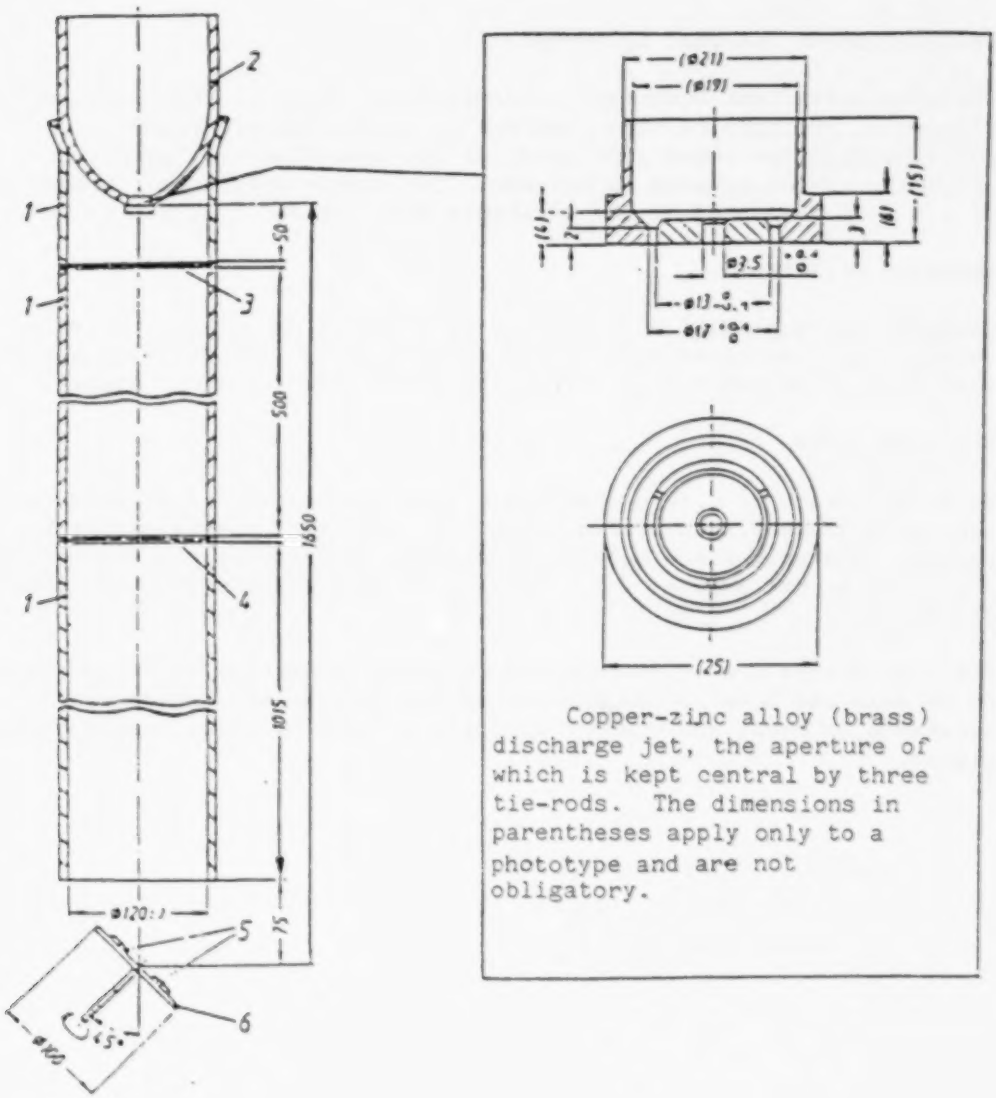
Natural quartz sand of a grain size of 0.50/0.7 mm, with no oversize, obtained by sieving on wire sieves complying with ISO 565 with a mesh size of 0.50 mm and 0.7 mm. The sand may be used up to 10 times.

3. TEST PROCEDURE

Three kilograms of 0.50/0.7 mm grain size quartz sand is allowed to drop through a gravity tube from a height of 1.650 mm onto the sample to be tested. The test piece and, if necessary, a control-piece are mounted on a turntable, the axis of which is at a 45 degree angle to the direction of the sand.

The test pieces are mounted on the turntable in such a way that the area to be measured does not extend beyond the turntable. Whilst the turntable is rotating, 3 kg of sand are allowed to spray over the test pieces.

Figure 1: Sand spray equipment



Copper-zinc alloy (brass) discharge jet, the aperture of which is kept central by three tie-rods. The dimensions in parentheses apply only to a phototype and are not obligatory.

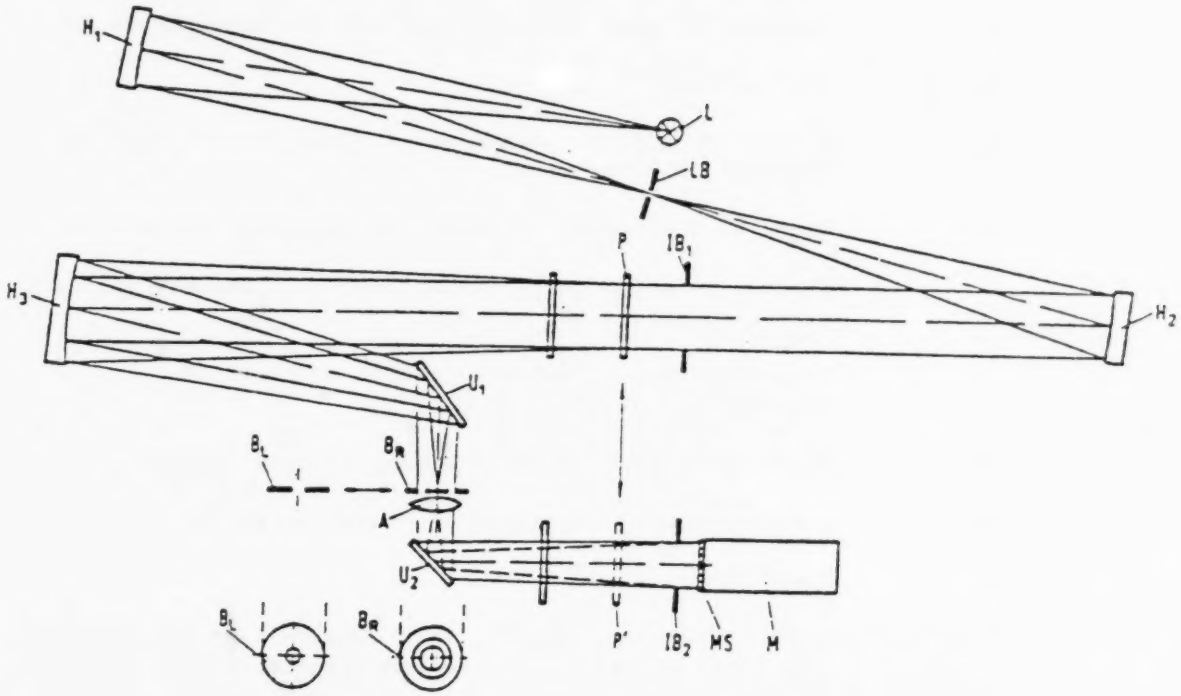
1. Parts of gravity tube
2. Container with discharge jet as figure 2, containing at least 3 kg sand
3. Upper sieve
4. Lower sieve
5. Test piece
6. Test piece holder (turnable)

Annex 11

METHODS OF MEASURING LIGHT DIFFUSION AND LIGHT TRANSMISSION COEFFICIENT

1. METHOD (a)

1.1 Equipment



This assembly collects all the unscattered light originating from the visor up to an angle of 0.72 degree (using diaphragm B_L) and all scattered light between the angles 1.5 degrees and 2 degrees in relation to the optical axis using diaphragm B_R. The angular area is important in the case of night riding, where a range in the immediate proximity of headlights has to be observed. The following dimensions are an information for the possible realization:

L	High-pressure xenon lamp (for example XBO 75 W)
H_1	Spherical concave mirror: focal length 150 mm; diameter 40 mm
H_2	Spherical concave mirror: focal length 300 mm; diameter 40 mm
H_3	Spherical concave mirror: focal length 300 mm; diameter 70 mm
A	Achromatic lens: focal length 200 mm; diameter 30 mm
U_1, U_2	Flat mirrors
B_R	Annular diaphragm: diameter of outer circle 21.00 mm; diameter of inner circle 15.75 mm
B_L	Circular diaphragm: diameter of aperture 7.5 mm
M	Silicon detector corrected according to curve V (λ) with diffusing screen MS
IB_1	Iris-diaphragm to adjust diameter of field of observation, diameter 40 mm
IB_2	Iris-diaphragm to eliminate edge effects from IB_1
LB	Circular diaphragm, diameter of aperture 1 mm
P, P'	Positions of visor.

Spherical mirror H_1 forms an image of light source L at diaphragm LB which is in the focal plane of H_2. The concave mirror H_3 forms an image of diaphragm LB in the plane of diaphragms B_L and B_R. The achromatic lens A is positioned immediately behind the diaphragm so that a reduced image of the test sample in position P appears on diffusing screen MS. The image of iris-diaphragm IB_1 is simultaneously formed on IB_2.

1.2. Measurement

The visor is positioned in the parallel beam to position P, then diaphragm B_L is set in place. The flux T_{1L} falling onto the detector corresponds to the undiffused light transmitted by the sample. Diaphragm B_L is then replaced by annular diaphragm B_R; flux T_{1R} falling onto the detector corresponds to the total diffused light originating from the visor and from the apparatus. The visor is then placed at position P'. Flux T_{2R} falling onto the detector

corresponds to the diffused light coming from the apparatus only. The visor is then brought out of the light beam (e.g. between P and P'). The flux T_{OL} falling on the detector with the diaphragm BL in place corresponds to the total light.

1.3. Optical qualities; definitions

1.3.1. Luminous transmittance:

$$\tau = T_{IL}/T_{OL} \times 100$$

1.3.2. Light diffusion before abrasion DB:

$$DB = 597 \times (T_{1R} - T_{2R})/T_{IL}$$

1.3.3. Light diffusion after abrasion:

$$DA = 597 \times (T_{1R} - T_{2R})/T_{IL}$$

2. METHOD (b)

2.1. Equipment (See figure 1)

The beam of a collimator K of semi-divergence $\gamma/2 = 17.4 \times 10^{-4}$ rd is limited by a diaphragm D_1 with an opening of 12 mm against which the sample holder is placed.

An achromatic convergent lens L_2 corrected for spherical irregularities links the diaphragm D_1 with the receiver R, the diameter of the lens L_2 being such that it does not restrict the light diffused by the sample in a cone with a top half angle of $\beta/2 - 14°$.

An annular diaphragm D_2 with extended angles α o/2 = 1° and α max/2 = 12° is placed in a focal image plane of the lens L_2 (see figure 2).

The non-transparent central part of the diaphragm is necessary to eliminate the light arriving directly from the light source. It must be possible to move the central part of the diaphragm away from the light beam in such a manner that it returns exactly to its original position.

The distance between the lens L_2 and the diaphragm D_1, and the focal length F_2* of the lens L_2 are to be chosen so that the image of D_1 completely covers the receiver R.

For an initial incident flux of 1,000 units, the absolute precision of each reading shall be better than 1 unit.

2.2. Measurements

The following reading shall be taken:

Reading (T_i)	With sample	With central part of D_2	Quantity represented
T_1	no	no	Incident flux in initial reading
T_2	yes (before abrasion)	no	flux transmitted by the new material in a field of 24°
T_3	yes (before abrasion)	yes	flux diffused by the new material
T_4	yes (after abrasion)	yes	flux diffused by the abraded material

2.3. Optical Quantities Definitions

2.3.1. The luminous transmittance is given by:

$(T_2/T_1) \times 100$

2.3.2. The light diffusion before abrasion is given by:

$(T_3 - T_2) \times 100$

2.3.3. The light diffusion after abrasion is given by:

$(T_4 - T_3) \times 100/T_2$.

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* For L_2 a focal diameter of about 80 mm is recommended.

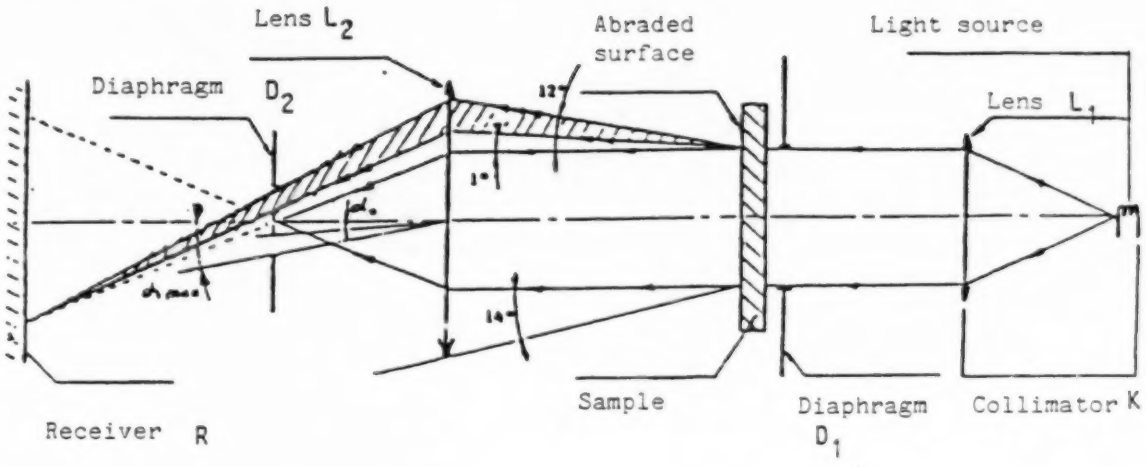
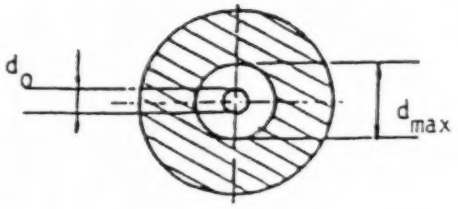


Figure 1: Test equipment



$d_o = 0.0349 \cdot F_2$
$d_{max} = 0.425 \cdot F_2$

Figure 2: Annular diaphragm D_2